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THE *JOURNAL OF PERIODONTOLOGY* is published to serve as the professional journal of periodontia; to keep dentists in touch with research being carried on in this field and related sciences; to stimulate greater interest in the supporting tissues of the teeth and their relation to oral and general health. The plan to continue the publication of abstracts indefinitely will make the Journal a fund of extensive information, readily available to students, teachers, researchers, and clinicians.

The Journal is the official organ of the American Academy of Periodontology and will contain, therefore, those papers of scientific and clinical interest which are presented at the annual meetings of that society. The January, 1941, issue will contain the transactions of the 1940 Cleveland meeting. This number begins the abstracts of important articles on periodontia that appeared during the year of 1939.

We are grateful to all who have made available the subject matter from which the abstracts and copies of abstracts have been made, including the authors of the original articles, the journals mentioned in the text of the abstract section, and those who have aided in any way in compiling the material presented in this issue.

"In 1826, Leonard Koecker, a dentist of London, formerly of Philadelphia, published his *Principles of Dental Surgery* incorporating as a chapter, a paper on the subject 'Of the Devastations or Absorption of the Gums and Sockets of the Teeth,' which Chapin A. Harris says was originally published in *Chapman's Journal* in 1819. This chapter is simply amazing in its incorporation of nearly all that is now known regarding practical diagnosis and conservative treatment of periodontoclasia. Since it is the first detailed discussion of the subject by a master, the chapter is appended to this article, for Koecker is not generally recognized for what he certainly was, the first of the modern periodontists."—*Extract* (p. 70) from "Diagnosis and Treatment of Periodontoclasia." Harold J. Leonard. (See p. 82.)

THE JOURNAL OF PERIODONTOLOGY

JULY, NINETEEN HUNDRED FORTY

[A SYMPOSIUM]

The Historical Background of Periodontology*

(CONTINUED)

1 1 1

DIAGNOSIS AND TREATMENT OF PERIODONTOCLASIA

By HAROLD J. LEONARD, D. D. S., B. A.
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THE HISTORY of the diagnosis and treatment of periodontoclasia up to the beginning of the nineteenth century is like that of other phases of medicine, a cloud of superstition and empiricism. It is shot through from time to time by beams of light as some acute observer and practical operator used his intelligence for an appreciation of the diagnostic facts involved and for treatments based on these facts. There is little of value in telling of the various vile decoctions used for rubbing in the mouth, or amulets hung around the neck or punctures made with a lancet in various parts of the body as a means of treating sore, flabby gums and loosening teeth. The interest of periodontists should rather rest with the occasional flashes of understanding starting with Hippocrates, which could have served as a basis for effective treatment many hundreds of years before such treatment became generally available.

The Egyptians, the Greeks, the Romans, and the early Chinese evidently all had plenty of periodontoclasia as the conditions are sufficiently described in their histories to identify the disease. The Hebrews must have been very little troubled with it as nothing like it is described in their history although the teeth were highly valued and are mentioned from time to time.

The following passages are quoted from Guerini's *History of Dentistry*[1], the first ones concerning the works of Hippocrates born 460 B. C.

*Read in part before the American Academy of Periodontology, October 20, 1938, St. Louis, Missouri.

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In the book *De Affectionibus* there is a passage where it is said that inflammation of the gums is produced by accumulations of pituita, and that in like cases masticatories are of use as these remedies favor the secretion of saliva and thus tend to dissipate the engorgement caused by the pituita.

By pituita is meant a glutinous mucus or phlegm.

In some cases of tooth-ache if the tooth is decayed and loose it must be extracted. If it is neither decayed nor loose, but still painful, it is necessary to dessicate it by cauterizing. Masticatories also do good as the pain derives from pituita insinuating itself under the roots of the teeth. Teeth are eroded and become decayed partly by pituita, and partly by food, when they are by nature weak and badly fixed in the gums.

Gingival hemorrhage in cases of persistent diarrhea is an unfavorable symptom. In fact the easy and frequent occurring of hemorrhages of the gums may, in many cases be an indication of a profound alteration of the blood, a condition serious in itself, but still more so when associated with persistent diarrhea.

In many who have enlargement of the spleen, the gums become affected and the mouth has a bad smell.

Hippocrates thus early noted that inflammations of the gums are due to what we now call *materies alba* and that persistent gingival hemorrhage is a symptom of what is now known as leukemia.

Celsus of Rome, born about 30 B. C., writes:

If the gums separate from the teeth it will be useful in this case also to employ those remedies called antherae. But it also is beneficial to chew unripe pears and apples and to keep the juices in the mouth. Equal advantage can be derived from keeping vinegar in the mouth provided it be not too strong.

Antiscorbutic treatment thus dates back to Celsus. He further

speaks of the looseness of the teeth caused by the weakness of their roots, or by the flaccidity of the gums, and says that in these cases it is necessary to touch the gums lightly with a red hot iron, then to smear them with honey and wash them with mulse, and later on to strengthen them with astringent substances.

Koch in his *History of Dental Surgery*[2] states that Celsus also practiced scarification of the gums; that is, made incisions through the flabby tissue between the teeth down to the bone underneath.

Servilius Democrates, a Greek physician of the first century A. D., gives many recipes for dentifrices. From these it appears that Democrates attached the greatest importance to cleanliness of the teeth and that he considered this the indispensable condition for avoiding disease of the teeth and gums.

Galen, born 131 A. D., a physician who influenced medicine greatly until recently and mostly in the direction opposite to the scientific approach, had a few practical ideas for the treatment of the gums amongst many highly theoretical and impractical ones. He advised the application of astringent substances like alum, gall nuts, and myrrh to inflamed gums.

If the gums are ulcerated he recommends them to be cauterized with boiling oil, using for the purpose a little wool wrapped around a probe or tooth pick. This medicament, says Galen, greatly modifies the diseased part exciting a reparative process in it, to aid which, however, suitable remedies must be used, and especially *frictions* with a mixture of gall nuts and myrrh reduced to a fine powder. For the cure of epulides the application of green vitriol (iron sulphate) together with an equal quantity of powdered myrtle and a little alum is especially recommended.

When one or more teeth in consequence of a trauma or from other cause become loose and project above the level of the others, Galen removes the whole exuberant part by means of a small iron file. In performing this operation, after having covered the gums with a piece of soft cloth, he holds the tooth to be filed steady with the fingers of the left hand using the file in such a way as not to give the tooth any shock. Besides he does not complete the operation at one sitting, but rather interrupts as soon as the patient feels any pain and continues after one or two days. In the meantime he makes use of remedies suited to strengthen the loosened teeth and bids the patient remain silent and nourish himself on liquid or soft food.

Paul of Aegina, in the seventh century, is the next to have any new or practical ideas. He says:

If a tooth projects above the level of the others, the protruding part must be removed with a file. This instrument may also be employed to remove sharp edges of broken teeth. Tartar incrustations must be removed either with scrapers or by means of a small file. To preserve the teeth and keep them healthy he recommends all tainted food to be avoided and also all possibility of indigestion and frequent vomitings; the use of very hard or glutinous food or of such as may easily leave a residium between the teeth, for example, dried figs and likewise very cold food and such as set the teeth on edge. He advises that very hard things should never be broken with the teeth and that the latter be carefully cleaned especially after the last meals of the day.

Avicenna, another Arabian physician of the same period, advises against the use of very hard tooth powders because of the damage they do to the dental substance.

Abulcasis, a great Moorish surgeon in Spain in the eleventh century, gives very minute and practical directions for cauterizing the flaccid gums of loose teeth. Furthermore he says,

Sometimes on the surface of the teeth both inside and outside as well as under the gums are deposited rough scales of ugly appearance and black, green or

yellow in color; thus corruption is communicated to the gums and so the teeth are in time denuded. It is necessary to lay the patient's head upon thy lap and to scrape the teeth and molars on which are observed either true incrustations or something similar to sand, and this until nothing more remains of such substance and until also the dirty color of the teeth disappears, be it black, green or yellowish or any other color. If a first scraping is sufficient, so much the better, if not thou shalt repeat it on the following day or even on the third or fourth day, until the desired purpose is obtained. Thou must know, however, that the teeth need scrapers of various shapes and figures, on account of the very nature of this operation. In fact the scalpel with which the teeth must be scraped on the inside is unlike that with which thou shalt scrape the outside; and that with which thou shalt scrape the interstices between the teeth shall likewise have another shape. Therefore, thou must have all this series of scalpels ready, if so it please God.

He also gives a description of the technic of wiring teeth loosened by trauma in a manner which might have been written today, so detailed is it and so careful in its avoidance of pit-falls. He was not the first to advocate splinting teeth with wire, however, as there is evidence that it was practiced at least as early as 500 B. C. Abulcasis stands out because of his intelligence and keen practicality. He really seems to be the first of the outstanding men to practice periodontia according to the principles we use today.

Giovanni of Arcoli in the fifteenth century gives ten rules for dental hygiene in which he summarizes the best ideas of previous writers. He observes that

whilst moderate frictions of brief duration are helpful to the teeth, strengthen the gums, prevent the formation of tartar, and sweeten the breath, too rough or too prolonged rubbing is, on the contrary, harmful to the teeth and makes them liable to many diseases.

Pietro of Argelata, in the same century, advised the use of *aqua fortis* (nitric acid) to make the teeth white after scaling off the tartar.

Benedetti of Verona, also in the fifteenth century, pleads for accurate diagnosis to save the loss of useful, healthy teeth mistakenly supposed to be the cause of toothache. He says,

For this happening, not only would the pain continue, but there would be in addition the loss of a sound tooth but also the disadvantage of the neighboring ones becoming less firm for want of support.

Ambrose Paré, sixteenth century, the father of French surgery, gives good directions for keeping teeth clean and for removing tartar with small instruments suitable for the purpose followed by a mixture of nitric acid and alcohol to take away what the instruments have not been able to remove. He says

If the teeth grow loose by means of the decaying gums the disease is then incurable.

It must be remembered as a reason for pessimism regarding the treatment of advanced periodontoclasia on the part of Paré and later excellent operators, that scurvy was fairly common and its cause unknown. Until the time of Fauchard in the eighteenth century, ordinary periodontoclasia and the periodontoclasia of scurvy were not distinguished. There is certainly excuse for failure to treat scorbutic cases successfully by means of operative procedures.

Fabricius of Aquapedente, an excellent surgeon of the sixteenth century, gives directions for scaling the teeth of tartar with slender instruments. In the case of flaccidity of gums he advises a superficial cautery, but since this is difficult to apply in the molar region he advises cutting away as much as possible of the morbid tissues before cauterizing the remainder.

Friederich Ruysch of Amsterdam, in the seventeenth century speaks of alveolar atrophy as a cause of loosening of the teeth and attributes the loss of bone as largely due to subgingival tartar.

The eighteenth century marks the real beginnings of dentistry as a separately practiced profession. Its greatest exponent was Pierre Fauchard who published his two volume text on dental surgery in 1728. For keen observation, profound experience, great common sense and remarkable technical ingenuity, he is certainly outstanding. However, while he summed up and utilized the experience of other writers before him, he did not add greatly to the diagnosis or treatment of periodontoclasia. And he was still influenced by the foolish ideas of his day as evidenced by his advocacy of the use of fresh urine to be rubbed on the teeth and held in the mouth for a time each morning and night. He recognized the ill effects of tartar and noted that it tended to form beneath the gum. He does not go into detail as to the removal of subgingival calculus which leaves the reader under the impression that he was not well versed in deep root surface curettage. He advocated surgical removal of hypertrophied and swollen flaps of pendulous gum but does not leave the im-

pression that he practiced surgical resection as it is done today in spite of the statement of Lufkin[3] in his recent *History of Dentistry* that "his treatment was based on the removal of the affected parts." He emphasized the difficulty of removing every speck of tartar and the necessity for removing it.

He was really the first to differentiate ordinary disease of the gums and alveoli from scurvy. He called it a special kind of scurvy. He also included the observations of earlier writers as to the local gingival effects of systemic causes especially scurvy, mercurial and lead poisoning, general diseases and dyscrasic conditions.

After having spoken in particular of various causes Fauchard adds,

'Little or no care as to the cleanliness of the teeth is ordinarily the cause of all the maladies that destroy them.'

John Hunter of London published his *Natural History of the Human Teeth* in 1771. While contributing much to the anatomy of the teeth and investing tissues, he confessed his failure to understand the cause or treatment of advanced disease of the gums and alveoli. He was sure that the disease is due to the tooth itself as evidenced by the fact that extraction of it and replantation of another in the socket caused cessation of disease. He also called attention to the drifting and disarrangement of the dental arches that occurs when a lower first molar is lost.

Robert Bunon, a French dentist, published books in 1743 and 1746 in which he considers dental tartar the constant cause of gingivitis and alveolar disease,

Without denying, however, that other causes of various kinds may contribute at the same time to produce it.

In cases of scorbutic stomatitis, Bunon advises, and very rightly, the complete removal of the tartar from the teeth before having recourse to any other local treatment. He also insists on the necessity of attending to the teeth and gums, and especially of freeing the former from tartar before undertaking the specific treatment for syphilis, considering the good state of the teeth and gums as one of the most important prophylactic measures against mercurial stomatitis. (Guerini)

Bourdet of France published in 1775 a book, according to Lufkin,[4] in which Lufkin says,

His text outlines a treatment for pyorrhea alveolaris which is based on the surgical removal of the diseased tissue; his technic is used today, with slight modifications.

In England, from 1798 to 1831, Robert Blake, Thomas Bell, Joseph Fox and James Snell contributed dental texts on anatomy, physiology, and operations on the teeth. Periodontoclasia was treated by scaling and polishing the teeth, scarification of the gums and the use of astringent mouth washes.

In the advertisements of early dentists in the United States in the latter part of the eighteenth century, John Greenwood and Isaac Greenwood guarantee to cure scurvy and disease of the gums and to cause them to reattach to the roots by removing infectious tartar. Josiah Flagg in 1800 sent directions for finger and brush massage of the gums to his patients.

In 1826, Leonard Koecker, a dentist of London, formerly of Philadelphia, published his *Principles of Dental Surgery* incorporating as a chapter, a paper on the subject "Of the Devastations or Absorption of the Gums and Sockets of the Teeth," which Chapin A. Harris says was originally published in *Chapman's Journal* in 1819. This chapter is simply amazing in its incorporation of nearly all that is now known regarding practical diagnosis and conservative treatment of periodontoclasia. Since it is the first detailed discussion of the subject by a master, the chapter is appended to this article, for Koecker is not generally recognized for what he certainly was, the first of the modern periodontists. There can be no doubt that he successfully treated a large number of advanced cases in precisely the same way that conservative periodontists are now treating them, even including the follow up care with what is now known as the Charter's method of tooth brushing and gingival massage.

The reason that Koecker did not receive the attention and following that his work deserved was that he simply was not believed. Horace H. Hayden and other leaders, not having trained themselves in the meticulous thoroughness of Koecker in removing all subgingival calculus, failed to get his successful results and hence did not believe that he got them either. He was simply branded as a charlatan and forgotten.

Hayden gives us a good idea of the prevalent opinion of his time on the subject of treatment in these words:

I have seen it in all its forms and stages, which perhaps it ever assumes; and although I am ready to admit, as before, that in its incipient stage it is susceptible of control, and at all times may by proper attention and treatment, be in some degree checked,

I do not hesitate to assert that a radical cure of the disease is beyond the reach of medical skill; and whoever will take a correct physiological and pathological view of the subject will not hesitate to admit the fact. This, however, is not to be understood as applicable to suppuration of the gums, when occasioned by the presence of any extraneous matter, as tartar upon the teeth. Every means for its cure that medical skill could suggest, such as emollient, astringent and detergent gargles of various kinds, astringent, tonic, and antiseptic elixirs, mercurial washes, absorbent powders, aromatic pastes, ectuaries, alteratives, sedatives, venesections, vesicatories, injections, setons, issues, excisions of the diseased parts, scraping the diseased bones, repeated applications of the actual and potential cautery, notwithstanding, their efforts have proved ineffectual.

In spite of the pessimism of Hayden and other leaders, devoted dentists continued to attempt to remove all subgingival calculus with more or less success. Among these were William H. Atkinson of New York and Henry S. Chase of Iowa City who devised ever more delicate instruments and actively taught and wrote on the subject between 1850 and 1875.

In the *Dental News Letter* of September, 1852, W. Lintott,[5] surgeon, and surgical and mechanical dentist of London, is reported to have written a book, chapter 5 of which deals with "Diseases of the Gums and Alveolar Processes." Quotations from this chapter indicate a very advanced viewpoint.

The close relation of these structures in a state of health, and their mutual association in disease, render their description under one head desirable. The diseases of these parts are of two classes: the one consisting of simple and ordinary affections, the local irritation; the other arising from constitutional causes . . .

The most common and frequent disease of the gums, is that affection miscalled "Scurvy." This is neither more nor less than chronic inflammation, combined with its consequences, arising from irritation produced and kept up, either by . . . a deposit from the secretion of the tartar glands, which collects around the necks of the teeth, and gradually usurps the place of attachment to the gums. This deposit increases hourly, pushes the gum before it, and produces considerable irritation and inflammation by the contact of its rough surface. The treatment insuring its speedy cure is most simple and easy . . .

When tartar is allowed to accumulate, its effects are, . . . inflammation and its concomitants of pain, swelling, sponginess, bleeding, and suppuration of the gums, inevitably followed by loosening and falling out of the teeth, through withdrawal of their means of support; . . .

The operation of removing the tartar is too frequently performed in a negligent and incompetent manner. It is not sufficient to merely take away that which adheres to the face of the teeth . . .: the most injurious portion is that which is *closely lodged* around and between the teeth, insinuating itself beneath the edge of the gum, where, if allowed to remain, it keeps up the irritation, and forms a nucleus for fresh deposits. If every particle be removed, and the whole exposed surface, both inside and out, be polished—all irritation will speedily subside, and the gum will reattach itself to the necks of the teeth, and again give firmness to those which had become slightly loosened. It will be necessary to scarify the gums—if the irritation has been extensive or long continued; . . .

In 1866, John M. Riggs of Hartford, demonstrated his treatment in Northampton, Massachusetts, on another dentist, Dr. Goodrich. The treatment consisted of a most thorough removal of all calculus to the depths of the pockets, together with a vigorous curettage of the soft tissue and rarefied bone beyond the pocket until sound bone was reached. This was followed up by the application of an astringent to make the gums hug to the tooth root, and a brushing technic for cleanliness and massage. There was nothing original or new about Riggs' treatment except, possibly the curettage beyond the pocket to stir up a healing reaction, and refinement of instrument types for the work. The great contribution of Riggs was his demonstration in clinic after clinic of the efficacy of thorough going skillful treatment. He simply could not be ignored or ridiculed for there were the results for the dentists to see. These results completely refuted the current teaching that periodontoclasia, except in the incipient stages, could not be cured. He cured it and the dentists who saw his clinics had to recognize the fact. Dr. Riggs had no patience with the technic of surgical gum resection practiced by some since the time of Bourdet in 1775. He says, according to Lufkin[6]:

Another writer takes off patches of the diseased tissue and another a strip of gum from wisdom tooth to wisdom tooth. This treatment is simply barbarous.

Dr. Riggs laid great stress on the general ill effects which disease of the gums and alveoli often cause. His case histories of persons in very bad physical states who were made well by clearing up diseased gums adds to a considerable number of such cases and observations by several authors of the preceding century and a half, beginning with Fauchard. The systemic aspects of gingival sepsis were better appreciated at that time than they were later up to the time of William Hunter's[7] pronouncement in 1911.

It was in 1857 to 1863 that Pasteur demonstrated that fermentation is due to micro-

örganisms, and began the era of bacteriology and modern pathology. It was of course some time before these principles began to influence dental teaching very much, but since that time the various remedies advocated for the treatment of pyorrhea alveolaris, as the disease was named by Rehwinkel in 1877,[8] have generally had a rational basis.*

The conservative treatment based on removal of irritants and restoration of health through cleanliness and massage of which Abulcasis, Koecker, and Riggs were among the early exponents, was carried on by R. B. Adair of Atlanta, William J. Younger, and others still among us. The chief modifications have been in instrument types of greater delicacy and precision, increased insistence on digital skill, and in greater dependance on massage as a means of creating a healing reaction rather than on curettage beyond the pocket depth or the introduction of aromatic sulphuric acid or astringents into the pockets after treatment. Younger was the first to demonstrate clinically that reattachment occurs in many instances after appropriate treatment thus obliterating the pockets without appreciable gingival recession. Since then a large amount of scientific histo-pathological work together with a steadily growing number of dentists well trained in the technic, the teaching of the subject in many of the dental schools, and especially the influence of the Academy of Periodontology have forced a reluctant recognition of the claims of workers in this field from Dentistry in general, especially in the United States and Canada. In Europe, periodontal treatment is still in an unsatisfactory state if one may judge from the literature from abroad. The lack of emphasis on instrumental technic is in itself enough to show that the teaching of Koecker, Riggs and their successors have not taken a firm root there.

EFFORTS TOWARD REATTACHMENT

An important criticism of the conservative treatment is that reattachment does not always take place between the tooth surface and the overlying gingival tissue covering the pocket: and even when it does it is of a type which is easily and rapidly separated when deposits and infection again irritate the tissue.

Early efforts to cause reattachment were directed toward the cementum which was assumed to be dead and pus soaked and more dense than normal, and therefore, resistant to reattachment. In 1899, Howard T. Stewart[9] advocated cutting part way through the cementum after which longitudinal grooves were cut through the cementum into the dentin. After washing out and drying the pockets, they were filled with mineral acid for five minutes to decalcify the root surface. The gums were also thoroughly lacerated. The operation was performed under the local anesthetic eucain. He also advocated devitalization of the pulp in order that access to the pulp canal might be gained for further decalcification of the root with mineral acid from within. The violent reaction which followed the laceration of the gums and use of strong mineral acid in the pockets was believed to be highly beneficial. The partial decalcification of the root was undertaken with the idea that it would open up the pores of the root to a new fibrous attachment otherwise impossible. A few dentists adopted the ideas and methods of Stewart, but on the whole they did not gain a wide acceptance.

M. L. Rhein[10] in 1899, and D. D. Smith[11] in 1902, also advocated the devitalization of teeth with advanced periodontal disease, on the theory that the blood supply normally going to the pulp would be diverted to the periodontal structures and lead to increased cementum formation and a more firm attachment. It was largely owing to the teachings of these men that the practice of devitalization of pulps and filling of root canals for reasons other than pulp disease became so widespread. Although there were many prominent dentists who condemned such devitalization during this period, the practice was not stopped until around 1915 when findings regarding focal infection disease and the prevalence of infections about root filled apices of teeth created a profound reaction against it in both the medical and dental professions.

Talbot,[12] in his book *Interstitial Gingivitis*, published in 1899, showed that bone resorption caused by advancing inflammation

*See *J. Periodont.* 10:14. Jan., 1939, re: who first used term pyorrhea alveolaris. Used 1864 by Adolf Pansch in title of a 29 page article, "De pyorrhoea alveolaris seu gingivitide expulsiva." Ed.

was at first merely decalcified by halisteresis and its matrix remained intact for some time. If this were not disturbed in treatment, and the causes of inflammation such as calculus and traumatic causes were removed and massage applied to restore the circulation, recalcification of the remaining matrix might be expected. He therefore, advocated a scaling technic of the roots with a minimum of injury to the overlying soft tissues of the pocket or bone matrix beyond the pocket. He emphasized the transitory nature of alveolar bone and believed it to be more susceptible to resorption from slight irritants and neuro-vascular disturbances than the underlying maxillae and mandible. He showed that lack of function leads to lacunar absorption of bone and predisposes to inflammation and that insufficient function leads to irregularities of the teeth and weak alveolar support. The teeth are constantly changing in their positions in the mouth, a process which is accompanied by absorption and redeposition of bone. Occlusal trauma due to shifting from loss of teeth or mouth habits such as thread biting puts strains on the alveolar bone, which, due to its unstable nature, predisposes to inflammation. He believed that any neurovascular disturbance in the alveolar bone, due to systemic disease might lead to alveolar absorption. He pointed out particularly the bad effects of poisoning by mercury, potassium iodide, brass, phosphorus, and lead, and of such systemic conditions as diabetes, scurvy, anemia, nephritis, paresis, alcoholism, pregnancy, and old age. Talbot was one of the first to make histo-pathological studies of the tissues involved and was the first to describe the epithelial lining of the pocket. He did not expect reattachment where pockets had once existed, but expected vigorous massage to cause shrinkage of the soft tissue to eliminate the pocket. He noted that the gingival crevice is peculiarly susceptible to infection because of its form.

Oskar Römer,[13] in 1905, was the second to describe the epithelial penetration in the formation of pockets. Besides scaling he advocated the use of Raquelin's cautery to remove the epithelium and diseased tissue in the pocket.

Frederick Hecker,[14] in a book, *Pyorrhea Alveolaris*, published in 1913, described the epithelial lining of the pockets and the need for removing it before reattachment could occur. His method was the use of 4% potassium hydroxide or antiformin (a strongly alkaline solution of sodium hypochlorite) to remove the epithelial barrier to reattachment.

In 1921, Fleischmann and Gottlieb[15] first announced their findings relating to epithelial proliferation in advance of the pocket and to the cuticle of keratin left on the enamel and cementum as the epithelium becomes severed to permit deepening of the pocket. This work and the subsequent work of Gottlieb and his students was the first adequate depiction by drawings and photomicrographs of the histopathologic conditions obtaining in gingivo-periodontal disease, and did much to educate the profession in the difficulties to be encountered in treatment.

In 1926, McCall[16] introduced his sodium sulphide solution as a means of removing the epithelial lining of the pocket in order to obtain an attachment of new pericementum to a new layer of cementum. While this technic is still advocated by McCall and his followers, no convincing proof has been produced that the epithelial lining is completely destroyed by it and that a new pericemental attachment does take place. In fact, proof to the contrary has been published by Beube[17] in 1939, who showed that reattachment was delayed and hindered rather than helped by the treatment.

In 1928, Box[18] brought out a method of removing the epithelium by means of soft tissue curets especially designed for the purpose. The curettage was done after all inflammation had subsided and the periodontal tissue restored to health. After curetting, the pocket was left filled with blood clot and protected from injury by a coat of varnish.

The first histologic proof of reattachment was offered by Box[19] in 1924, in his booklet *Studies in Periodontal Pathology*. The type of attachment shown was largely epithelial and to a lesser degree a connective tissue capsule, but failed to show new principal fibers imbedded in a new layer of cementum.

Confirmation of reattachment by epithelium was shown in a beautiful series of photomicrographs in an unpublished essay before the Better Dentistry Meeting in New York in 1936, by William Reppeto of

Dallas, Texas. The epithelium had reattached to both cementum and to dentine in an area where the dentine had been exposed by curettage of root surface.

Epithelial reattachment has thus been demonstrated to be the form of reattachment probably commonly seen by periodontists after successful treatment. Such reattachment is of course not as good as new pericementum anchored to new cementum and new alveolar process. It does not give additional support to the tooth and it is liable to reinfection and splitting to reopen the pocket unless the follow up care is adequate. However, it obliterates the pocket and maintains the covering of the root both of which are great advantages.

Recently Beube[20] has undertaken a series of experiments by which, after health is obtained by the usual conservative treatment, a flap is opened as for an apicoectomy, by which the deeper portions of the former pocket are exposed. The lining epithelium and any remaining soft granulations and rarified bone are curetted away and the pocket area packed with boiled bone powder and blood clot, after which the flap is carefully stitched back into place. In several of his cases new bone has been shown to form in the area of the former pocket within a few weeks of the operation in the same manner as it does in an apicoectomy wound in which bone powder is used. The technical difficulties of this operation are great and have not been sufficiently overcome to give it wide application, but it is a promising lead.

GINGIVAL PLASTIC OPERATIONS

Efforts have also been made to restore the gingival tissue lost by recession. In 1904, Younger[21] of Paris reported on an operation by which a flap was cut back of the third molar and turned to cover the buccal roots from third molar to cuspid as a graft. He reported that the graft took but afterwards shrank down to about a fourth of its original widtl. so that the recession was not greatly improved in the end.

Another operation reported by Harlan[22] in 1906, for unsightly recession and as later modified by Rosenthal[23] in 1912, consisted in making a slit in the mucous membrane horizontally over the root tip after which the soft tissue occlusal to the slit was loosened from the root and underlying bone, and moved occlusally where it was held in its desired position by stitches bound around the tooth. A raw wound was left overlying the periapical bone, but this soon healed over. Rosenthal called this operation "Autoplasty." He does not report on the end result after several years.

PROTECTIVE COATING

In an early effort to keep saliva and oral bacteria out of the pocket while healing was taking place following the scaling of the root surface, W. W. Atkinson[24] in 1865, advocated the application of saturated iodine in creosote to the dried gingival margins, followed by an application of tannic acid in glycerine. When the saliva comes in contact with these drugs, a film is formed which remains as an impermeable protection for at least forty-eight hours. This treatment is still advocated by T. B. Hartzell.

MASSAGE

The technic of massage has varied from time to time. The necessity for stimulation of the gums has been recognized from very early times, but the application has been mostly by means of friction and rubbing. Here and there warning has been issued of the danger of rubbing the gums and the use of friction especially with abrasive substances.

Leonard Koecker,[25] in his work previously noted, recommended a brushing technic which would compress the gums from the occlusal toward the apex as a means of stimulating the gums and squeezing out debris under their margins. He advocated a soft brush following instrumental treatment for a short time after which brushes of increasing hardness were to be used as healing occurred until the hardest could be borne without pain. His principles of massage were much the same as those now generally adapted by most periodontists.

In 1907, H. J. Allen[26] advocated a vibratory massage. He quoted S. J. Milzer, a physician, to the effect that bacterial growth was inhibited by a continuous vibration. Dr. Allen urged finger massage, the use of the rubber finger brush or a towel wrapped about the finger as a means of reaching areas not compressed by the brush.

In 1908, W. E. Griswold[27] introduced a vibratory massage made by a rubber cup applied to the teeth and gums, fastened in an engine gold plugger.

Recently P. O. Rosenthal of Minneapolis

has improved on this idea by inventing an electric tooth brush rotator which vibrates a brush held in it about 150 rotations a minute. This is held against the teeth and gums and does produce a more vigorous massage than is ordinarily given by hand brushing.

Various other devices have been introduced from time to time for purposes of massage where deep areas of congestion would not be reached by pressure exerted by the tooth brush alone. The polished round tooth pick was advocated by Paul Edmund of Chicago in a clinic about 1933. This was passed through the interproximal space and repeatedly pressed down against the interproximal gingiva sufficiently to compress the soft tissue to its depth. In recent years several rubber points at right angles to handles have been devised for the same purpose. In 1912, J. L. Kelly[28] devised a clamp like a hemostat to hold short cotton rolls with which to scrub the teeth and massage the gums. He also had his patients use a wooden stick in a porte polisher as a means of getting deep massage.

DUNLOP SPRAY

Another quite different method of stimulating a healing circulation in congested areas about the teeth was devised by Dunlop[29] in 1914. It consisted of an apparatus for forcing oxygen gas containing medicaments under pressure into the gingival tissues. A fine tip is inserted under the gingival margin and a jet of oxygen gas containing finely divided powder or liquid, is emitted with sufficient force to enter into the tissue spaces. The effect is one of oxygenation. The contained drugs, ethyl borate, menthol, etc., are also slightly irritating and stimulating. The method had some vogue for a time which died down in the United States, but has been taken up by B. Gottlieb formerly of Vienna and by Box[30] in Toronto, who believe that it has real merit and are using it at the present time. C. H. Tozier[31] in 1904, seems to have been the originator of the idea of spraying medicaments under pressure of gas into the gingival crevices.

RAY THERAPIES

X-rays and high frequency currents (Parker,[32] 1903), various light rays (Michael,[33] 1911) and radium emanations (Trauner,[34] 1913) have also been used as methods of stimulating the circulation in sluggish periodontal tissues. Apparently these have never been widely accepted and have been almost entirely discarded in recent years in favor of simpler yet effective methods of accomplishing the desired purpose.

While the so called conservative treatment has been evolving to its present position, other treatments have been tried, most of which have been discarded and a few incorporated into current practice either as a routine method of choice or as an adjunct to conservative treatment.

SURGICAL RESECTION

By far the most important of these in point of popularity is the surgical resection of the diseased gingival and alveolar tissue. Started by Bourdet of France in 1775,* it has had a considerable vogue in Europe where it became later known as the Robitzeck operation. It has been advocated for deep pockets from time to time in this country, but has gained recent popularity as a routine procedure due to the teachings of A. D. Black[35] at Northwestern University who advocated it in 1920 and especially on the West Coast due to the energetic demonstrations of A. W. Ward.[36] Ward has developed an excellent set of instruments for the work and a method of covering the cut tissues with an adherent antiseptic and sedative cement until they are healed. This method of covering the tissues until healed has eliminated one of the most objectionable features of the operation, that is the after-pain and soreness. It also keeps the field clean until healing has occurred thus preventing recurrence of infection while resistance of the parts is low. Surgical resection is more immediately effective than conservative treatment in that infected tissue is removed instead of being simply relieved of irritants so that it can heal. When the overlying tissues are removed it is a simple matter to cleanse the denuded root surfaces of all calculus and debris under direct vision. Also it eliminates a flap of soft tissue overlying the pockets which, while it may attach to the root under ideal conditions, is always more susceptible to reinfection than a gingival margin immediately underlaid with fibrous and bony support, and which can

*S. R. Parks quotes Fabricius' description of his method of surgical resection used previous to the year 1619. To be published *J. Periodont.* Jan. 1941.—Ed.

be maintained in health only by systematic follow up care. A slow building up of firm healthy gingival tissue follows the surgical resection, providing that home care is good, which in many cases may restore it almost to its level before resection. For these reasons and because it is a simple surgical operation easily learned by any well trained dentist it has a wide vogue in spite of its serious disadvantages. The principal disadvantage of it is that it exposes the root surface for months and often permanently, far more than is the end result in most cases of conservative treatment. Such exposed root surfaces are unsightly, likely to be hypersensitive, liable to caries and difficult to keep clean.

A modification of the surgical resection is the flap operation introduced in this country in 1918 by Zentler[37]. By it the gingiva is laid back, the infected tissue curetted out and rarified bone margins smoothed, after which the gingival flap is trimmed and stitched back over healthy tissue.

Other modifications of the surgical resection are the electro-coagulation technic of Webb[38] (1935) and the electro section technic. By electro-coagulation, a high frequency current is passed between two electrodes to generate mild heat. The electrodes are placed over the area of gingival flap which it is desired to remove and the current applied until the tissues between the electrodes is barely coagulated. The tissue is then left to slough away which it does without great soreness and no hemorrhage. The method is popular because it is easy to apply and employs an interesting electrical gadget. The treatment is not as positive in its healthy results as surgical resection followed by the sedative cement and has the same disadvantages otherwise.

Electro-section introduced by Hopkins[39] in 1934, is simply a method of making an incision with a cold wire through which a high tension current is passing. The tissues are coagulated in contact with the wire sufficiently to separate them without coagulation beyond the point of contact. The method is being advocated because it can be made bloodless. Otherwise it appears to offer no advantage over the straight surgical resection.

Another surgical method of treatment advocated in 1897 by Robert E. Payne[40] was extraction followed by scaling and reimplantation. John Hunter in 1771 spoke of the good result seen in one case as it was practiced even in his day, but did not advocate the method as a regular means of treatment. Implanted or reimplanted teeth usually become first ankylosed to the bone of the alveolus after which the root is absorbed and the crown drops off. The method as a treatment for advanced periodontoclasia is apparently no longer in use.

In 1891, D. C. G. Watkins[41] advocated the removal by resection of a root involved to the apex or near it with periodontoclasia in which the other roots of the teeth were well supported. This applied especially to upper first molars in which the palatal root was involved. To prevent decay of the stump under the crown it was covered with oxyphosphate of copper cement.

POCKET PACKERS

A combination of conservative treatment with shrinkage of the gums is accomplished by pocket packing advocated by Piergili[42] of Rome in 1911 and Dunlop[29] in 1914. The pockets are distended with wax (Dunlop), Beck's bismuth paste (Piergili), gutta percha or cotton dipped in wax or resin, until the gingiva is blanched. After a few days an atrophy of the gingival flap occurs leading to recession similar to that after resection. Access is also gained for removing calculus under direct vision. Box[43] is using and teaching the use of Dunlop's wax "pocket pak" at the present day.

ASTRINGENT AND CAUTERANT DRUGS

Various drugs have been used to cause shrinkage of the loose flaps of gingival tissue overlying pockets. In early days astringents such as nut galls (tannic acid) were used. In more recent times zinc chloride solutions have been the astringents of choice, although copper salts have had advocates. Astringents lead to a diminution of an inflammatory process by causing contraction of distended capillaries and thereby giving an appearance of healing. They are, however, very superficial in their action and do not reach the deep areas of congestion which are difficult to reach by massage. At present few periodontists feel that astringents give any additional benefit beyond that given by brush massage.

Cauterant drugs have been widely used and are still used to some extent. Strong mineral acids like sulphuric were generally

advocated in the nineteenth century as a means of dissolving subgingival calculus and causing shrinkage of the overlying soft tissue. Many writers at that time condemned the practice as leading to hypersensitive root surfaces and a few cases of alveolar necrosis were reported. In the early twentieth century lactic acid and phenol sulphonic acid were tried, but these also caused hypersensitive roots. In 1908, Joseph Head[44] brought out his ammonium hydrogen fluoride as a means of softening subgingival calculus without decalcifying the root surface. This was widely acclaimed for two or three years and an official report of the Committee on Practice of the New York Dental Society[45] signed by Arthur H. Merritt and William B. Dunning gave it unqualified approval in 1910. Bad results began to be reported, however, and the drug lost its popularity shortly thereafter.

Trichloracetic acid, silver nitrate, and other strong cauterants have had some use as a means of destroying soft gingival flaps overlying pockets. The results are slow and painful and most modern periodontists prefer surgical resection followed by surgical dressing where elimination of gingival flaps is desired.

Oxyphosphate of copper cement is used by many periodontists as a means of eliminating an insanitary space between roots. In exposed bifurcation spaces in lower molars, it is applied after the tissues have healed following instrumental treatment. It is inserted by means of two gutta percha cones dipped in the newly mixed cement, one inserted from the buccal and one from the lingual. After setting, the excess cement and gutta percha are ground away. The originator of this technic is unknown. LeRoy,[46] in 1920, advocated filling the interproximal holes left following Vincent's infection with oxyphosphate of copper cement. Tin foil was wrapped around one root prior to insertion of the cement so that the cement would be attached to but one of the approximating root surfaces. The method is used by leading periodontists in selected cases to this day although the tin foil has been discarded as unnecessary.

ANTISEPTICS AND GERMICIDES

When the idea became prevalent that bacterial infection was involved in gingivoperiodontal disease, efforts were directed to eliminate it by means of antiseptic or germicidal medication.

M. L. Rhein[47] started this train of effort in 1893 by injecting pyrozone (hydrogen peroxide) into pockets in the effort to sterilize them. In 1897, John M. Fogg[48] of Philadelphia, and Ernest Sturridge,[49] of England, independently reported on cataphoresis as a method of carrying medicinal ions deep in the tissue by means of a weak galvanic current. This was advocated for periapical infections through root canals and for deep periodontal infection. By using the appropriate electrode, zinc or iodine could be caused to penetrate a considerable distance into the tissue about the electrode. The method is still used in root canal therapy, but is not at present advocated for periodontal disease since it is very time consuming and no additional clinical advantage can be noted in addition to the treatment removing all local irritants, and home care massage to restore blood circulation, which procedures must be followed anyway.

In 1904, G. Lenox Curtis,[50] a physician, stated that the suppurative variety of pyorrhea was due to syphilis. This started a group of dentists and physicians off on antisyphilitic treatment as a cure for pyorrhea. The army physicians and dentists especially took it up (White[51] in 1915). The treatment consisted of injections of succinamide of mercury into the gluteal muscle. In spite of the fact that Reed[52] tested the syphilitic relationship and found there was none, and Cox,[53] in 1916, reported bad systemic effects from the use of the drug, enthusiastic reports of cures of pyorrhea by the drug poured in for several years.

VACCINE THERAPY

About the same time, in 1904, the use of antistreptococcus vaccines and serums was suggested for periodontoclasia by H. C. Boenning, M. D.,[54] although the idea probably came from Goadby[55] of England. Vaccines were made up from cultures obtained from pyorrhea pockets and injected directly, or animals were injected until a high antibody blood content was supposedly built up and the animal serums injected into human pyorrhea cases. Later the opsonic index was used as a means of determining which of the many microörganisms found in pyorrhea pockets were the pathogenic ones. Vaccines made up of single streptococcus types or those of combinations of streptococci, staphylococci, and other organisms were tried out. For many years the literature was full

of the reports of the successful use of vaccines. A few periodontists like J. D. Patterson and A. H. Merritt disparaged the use of vaccines during this period, but it was not until 1916 when Merritt[56] published the results of a very thorough investigation that the use of vaccines in periodontoclasia was finally discouraged. By that time it was evident to immunologists that the microörganisms of the coccus types found in the periodontal tissues, for which vaccine could be made, were so mildly pathogenic as to be incapable of provoking an appreciable antibody reaction. Vaccine therapy was thus shown to be theoretically impotent for such chronic infectious conditions as periodontoclasia, while clinical periodontists were proving it to be useless in practice. Another factor that caused doubt in the profession about the enthusiastic reports of cures by vaccine therapy in periodontoclasia was the wave of equally enthusiastic reports that came following the use of emetin preparations.

EMETIN

The endameba gingivalis was discovered to be present in the exudate from periodontal pockets in 1914 by two independent groups of investigators, Bass and Johns,[57] of New Orleans, and Barrett and Smith,[58] of Philadelphia. Because certain amebas were known to be pathogenic it was assumed that those found in gingival exudate might be. Efforts to rid the gingivae of these organisms by means of amebacidal drugs such as ipecac and its active principle emetin, seemed to cause improvement in the gingival inflammation. Thus the case was proved. Again the literature was flooded with reports of remarkable cures resulting from the use, this time of emetin preparations. These two waves of enthusiasm were mutually antagonistic and tended to nullify each other. If micrococci were the cause of pyorrhea, how could amebacides which had no known effect on micrococci be so beneficial and conversely if endameba gingivalis were the cause how could micrococcus vaccines, which had no known effect on endomebae, be so potent. A number of the most authoritative periodontists, among them Talbot, Rhein, Merritt, Hartzell, and others from 1915 to 1920 gradually proved to the profession that the endameba gingivalis is not pathogenic, that it is present even in those without gingival inflammation and that actually emetin, while it does eradicate amebae, has no real curative effect on periodontoclasia.

TRAUMATIC OCCLUSION

Mobility of teeth as a cause of irritation of their attaching tissues has been recognized from the earliest times. Koch, in his history of Dental Surgery, says that wire splints for loose teeth were used as early as 500 B. C. Mention has already been made of the efforts of Galen in the second century A. D. to relieve occlusal trauma by filing off interfering points. Also that Hunter, in 1771, showed the injurious effects of the loss of a lower first molar and of spaces between the teeth which lead to lack of support, shifting and looseness. Talbot,[12] in 1899, discussed the bad effects of excess loads on teeth from partial dentures and bridge work and of such habits as thread biting. In 1903, W. V. B. Ames[59] presented a very advanced article on the function of fixed bridge work as a means of stabilizing teeth which lack mesio-distal support. In 1906, C. J. Grieves[60] indicated how settling partial dentures act to bring strain and loosen abutment teeth. In 1908, P. B. H. Quedenfeldt[61] stated that he first heard of malocclusion as a cause of pyorrhea five years before from Karoly of Vienna. Since then he has come to believe that in sixty per cent of the cases the pyorrhea is caused by occlusal stresses due to a closing bite from the loss of the lower first molar, or from faulty mouth habits such as grinding on the teeth at night, biting on threads, pipe, or finger nails, etc. When the bite is closed so as to cause excessive overbite, he advocates opening it by bridge work and occlusal restorations.

In 1911, T. B. Hartzell[62] stated that G. V. Black claims that ninety-five per cent of pyorrhea is due to faulty contact points. Dr. Hartzell himself emphasized the role of food impaction, loss of contact, too long cusps and tooth pick irritation. Grieves,[63] in 1912, warned that ordinary removable bridges and partial dentures have so much play that they do not stabilize the abutment teeth and support them sufficiently against occlusal stresses. J. K. Burgess,[64] in 1915, presented a method of splinting loose teeth by means of a series of attached pinlays. He also advocated interlocking inlays for teeth

which tended to drift apart. I. R. Cottrell,[65] in 1917, stated that some form of inflammation always precedes pocket formation and that he finds that trauma from malocclusion or faulty contacts is the chief cause of such inflammation.

While here and there advanced students of dentistry were making these observations, the idea that occlusal overstrains due to shifting teeth from loss of teeth or contact support or from pernicious mouth habits were an important predisposing cause of periodontal disease, made very little headway. Even today the profession in general and periodontists in particular do not credit this factor with its true importance. It is very little considered in the teaching of the dental colleges and is not yet a part of the background information of all dentists, which it must be if dentists are to perform their full function of maintaining the teeth and periodontal structures in health throughout the lifetime of their patients.

The subject has been forcibly presented by Stillman,[66] starting in 1917, followed by McCall. The histopathological work presenting the degenerative metamorphosis that occurs about teeth which are receiving stress over a long period was published by H. K. Box,[19] in *Studies in Periodontal Pathology* (1924). In this publication he shows how the alterations in the pericementum and alveolar process open the way, when gingival infection is present, for the deep periodontal penetration and pockets commonly seen where the teeth have been subjected for a long period to, to and fro movements in their sockets.

INSUFFICIENT JAW FUNCTION IN MODERN MAN

While a great deal has been learned of the causes of periodontoclasia and of successful means for its treatment, the fundamental question as to why modern civilized man is so subject to this disease has not been so thoroughly studied. Talbot[12] was perhaps the first to attack this problem in his book in 1899. He showed that in primitive man the jaws are large and protrude in advance of the forehead while in modern man the jaws tend to recede in relation to the skull. In primitive man the palatal vault is low and the alveolar bone is heavy, the teeth large and full crowned giving ample space for interproximal bone. In modern man the vault is high, the alveolar bone thin, the teeth long and narrow with but little space between the roots for the bony septa. His general conclusion was that lack of sufficient masticatory function in modern man was the chief cause of underdevelopment of the masticatory organs and was an important predisposing cause of the disease and infection of the periodontal structures. This idea was carried further by the researches of H. L. Wheeler[67] (1906), who found that the teeth of primitive man were greatly worn down during the lifetime, indicating great function and grit in the diet. The jaws, which indicated by wear and heavy alveolar bone that function was great, seldom gave signs of deep periodontal disease, although salivary calculus might have caused some alveolar recession. W. R. Pond,[68] in 1914, reported that immigrants to the United States who continued to eat the coarse food to which they were accustomed in their home countries had healthy teeth and supporting tissues while those who changed to the usual soft American diet soon developed dental caries and periodontal disease. In 1915, N. N. Znamensky[69] of Moscow advised the chewing of solid food such as crusts of brown bread and the use of Caucasian or Siberian gum as exercise for the teeth and periodontal structures. In 1928, H. K. Box[18] demonstrated that under the usual conditions of primitive life where heavy mastication accompanied by wear from grit in the diet occurs, the cusps of the posterior teeth which are needed to guide the teeth into their proper relationships at the time of eruption, soon wear off, thus eliminating the cause of lateral strains on these teeth. Also the incisors, which at first are somewhat overlapped, soon wear through so as to have an end to end occlusion. Such an occlusion with shortened teeth and without interfering cusps, he thinks is far less likely to lead to periodontal stresses which predispose to periodontoclasia.

L. M. Waugh,[70] in recent studies of primitive Eskimos who never develop periodontoclasia while living on their native diets, found that the biting strength is something over two hundred pounds and in some cases may be as much as three hundred and fifty. Tests of biting strength of college students by Brekhus[71] indicated that few exceeded one hundred and twenty-five pounds.

It thus appears that an important reason

for the tendency of modern man to periodontoclasia is insufficient masticatory function from infancy up. It requires work to chew hard, tough food. Children avoid it if they can and thus tend to underdeveloped masticatory structures. The food of most city dwellers is too soft to require the function which would maintain periodontal structures and their blood circulation in a condition highly resistant to bacterial invasion.

DIET

Another attack on the causes of susceptibility to periodontal disease has been by way of diet. P. R. Howe[72] (1911) cited cases in which the elimination of meat from the diet greatly benefited periodontal disease and its subsequent use brought the disease back again. G. V. Black,[73] in the same year, published his findings on the cause of salivary calculus showing that overeating, especially of protein foods, caused heavy protein deposits to form on the tooth surfaces closest to the salivary ducts. By reducing the amount of food and by eating slowly, the deposits did not form. Stewart,[74] in 1913, found that those who took a large amount of lemon juice and water and lived largely on fruit had a much more healthy gingiva than others. This was confirmed by Milton Hanke,[75] in 1933, who added a large orange juice content to the diet of several hundred orphanage children for a year and discovered that gingivitis disappeared from their mouths without other treatment.

The end of this phase of the problem is not yet in sight. Whether faulty diet affects the periodontal structures by causing irritating salivary deposits on the teeth and increasing bacterial growth at the gingival margin, or by poisoning the tissues by excess products from within or by withholding certain minerals or vitamins necessary for tissue health, is a problem for the future to decide.

PATENT MEDICINES

The field of periodontia has always been a happy hunting ground for drug manufacturers and salesmen. Dentists who have not the faintest idea of the causes of periodontoclasia, yet faced with the loss of teeth from the disease in their patients, have eagerly clutched at any remedy which promised a cure. The credulity of dentists in this field has been a big aid in keeping the patent medicine industry profitable. Even respectable dental goods houses have not been able to resist the temptation which the profession offered. Countless patent pyorrhea cures have flooded the market and still do so. It is always hoped that some drug will prove specific and can then be incorporated in a tooth paste and sold on a nationally advertised basis to the public. Of human credulity there is no end. The best evidence of the uselessness of drugs in this field is that the periodontists who are well recognized as the most competent and experienced, use few, if any, drugs to aid them in their treatment.

THE FUTURE

Treatment of periodontoclasia by dentists in general is still in an unsatisfactory state for the reason that dental diagnosis and periodontia treatment are still not adequately taught in the dental schools. It is only within the last years, since Dr. L. E. Blauch[76] published his dental curriculum survey for the American Association of Dental Schools, that it has been recognized that teaching of oral diagnosis as a separate study, as the central core of all clinical teaching, was necessary. Dental diagnosis is the study of conditions in the mouth which are leading or may lead to disease as well as the identification of disease and defects already present. This study necessarily must concern itself with the causes of periodontal disease more than those of any other condition in the mouth. The proper teaching of oral diagnosis in all of the dental schools will go a long way toward educating the dentists in periodontology.

The treatment of periodontoclasia is not so well placed in the curriculum survey. It is given a subordinate position as a division of dental therapeutics of which root canal therapy is the principal subject. This is a situation which must be remedied if good training in periodontia is to be given unless, indeed, it is to be made a branch of oral surgery and the surgical resection method be all that is taught. If adequate treatment is to be taught, it must be by teachers who are themselves skillful and experienced periodontists, whose major interest is in this field. The diagnosis and treatment of periodontoclasia are no longer mysteries. It is time for periodontology to become a regular part of teaching in all dental schools and a part of the clinical equipment of every practicing dentist.

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Following is the chapter from Koecker's book *Principles of Dental Surgery* (published in 1826) referred to by H. J. Leonard (Page 70) and included with his paper as an Addendum.

PRINCIPLES OF DENTAL SURGERY

By LEONARD KOECKER, SURGEON DENTIST

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CHAPTER III

OF THE DEVASTATION OR ABSORPTION OF THE GUMS AND SOCKETS OF THE TEETH

This disease, in my opinion, is far from being accurately understood, and is generally supposed to be incurable.

The remarks which I am about to offer being the result of close observation, are well deserving of attention, inasmuch as the subject is of no inconsiderable importance, especially in this country.

In his *Natural History of the Teeth,* vol. i. p. 51, Mr. Hunter says "how far these diseases can be prevented and cured, is, I believe, not known."

Fox differs very little from Hunter on this point in his *Nat. Hist. &c.* part ii. p. 95. He speaks on the subject in a very vague manner, and so much so, indeed, of its cure, that I am inclined to believe that he never saw an example of it, at least, not after the disease had advanced to any considerable extent. At all events, the subject has not been considered with sufficient attention by these or any other writers whose works have come under my notice.

This malady has its beginning, generally, in an inflammation and suppuration of the gums, which gradually extend to the periosteum, or the alveolar processes of the teeth; or it begins by an inflammation of these parts, which is afterwards communicated to the gums: it very rarely originates in the alveoli themselves.

The inflammation and suppuration are seldom violent, and the absorption seldom rapid: in most instances it is so slow in its progress as to be scarcely perceptible, and the suppuration destroys the gums in a very gradual manner, being attended by the absorption of the alveoli and their periosteum; until the teeth, losing their support, become loose, and at successive intervals, drop out.

The disease rarely attacks all the alveolar processes at once, but generally begins at some one part of the mouth; I have seen it commence at the incisors, though more frequently it first invades the molares.

The crowns, necks, and more especially the exposed parts of the roots, are frequently covered with a greenish glutinous substance, and with adhering tartar; the spaces between the teeth are filled up with tartar of a dark brown or greenish colour; but, sometimes they are of the usual appearance.

In other instances I have seen them so clean as to deceive a superficial observer; but a close examination has never failed to show some tartar, adhering to the roots, and pressing on the alveolar processes, hidden under the edges of the gums, and in the spaces between the teeth.

This deceptive appearance of cleanliness, is generally the effect of improper or superficial dental operations, as scaling and cleansing the teeth, by which the tartar is but partially removed, and some permitted to remain in those very places where it is the least observed and detected, but where it causes the greatest mischief.

The gums are, for the most part, a little swelled and inflamed, and attended by a thin pus-like discharge from between them, the roots of the teeth yielding a very offensive smell. Thus these parts sometimes exhibit a tolerably healthy appearance, though, never, as far as my experience has gone, have they been perfectly free from inflammation, as Hunter and Fox have stated; although I will not deny that this

appearance may often deceive those who are not habitually familiar with the very minute local symptoms of the chronic disease of those parts.

Persons of robust constitutions are much more liable to this effection of the gums, than those of delicate habits; and it shows itself in its worst forms oftener after the age of thirty, than at an earlier period. The teeth of such persons are generally sound, or very little affected with caries, though I have occasionally met with exceptions to this observation.

After the age of forty or fifty, it commonly occurs in a chronic state in individuals of robust health, who have not taken proper care of their teeth; in most instances advanced age is unjustly considered to be the cause of the disease, for the malady might generally be prevented, and the teeth preserved during life, by a proper care, and a judicious dental treatment.

The lower classes are particularly subject to this affection; and not even those country people who enjoy uninterrupted good health, and the influence of the most salubrious atmosphere, and who have originally the most beautiful and healthy teeth, are altogether free from its attacks. In these persons, although possessing robust health when young, in consequence of an entire disregard of cleanliness, and a greater predisposition to the production of tartar from various general causes, at a late period of life, a great quantity of tartar is accumulated, and the teeth, though entirely free from caries, are frequently lost one after another, by this destructive malady of their gums and contiguous parts.

This disease seems to be confined to no particular climate, and is more or less prevalent in every part of the world: I have observed the inhabitants of the most opposite countries, the Russians, the Germans, the French, the Italians, the Spaniards, the Portuguese, the English, the Africans, the East and the West Indians, and the inhabitants of the United States, to be all more or less liable to it.

The late Dr. La Roche, of Philadelphia, informed me that he had frequently seen this disease in the French Colonies at St. Domingo, and in persons of different ages; that its progress was very rapid, and, probably from its frequency, that it was generally considered peculiar to the climate, and altogether incurable.

In the United States of America, this malady is much less frequent among the natives than amongst those foreigners who arrive there with a robust constitution and sound teeth, as the former are generally of less plethoric habits, and more subject than the latter to those diseases which primarily affect the teeth, and produce secondary affectations of the parts connected with them; still, however, the Americans are often subject to its destructive ravages.

During my short practice at Lancaster, in Pennsylvania, in 1812, I saw a gentleman, a native of that state, aged about forty five, and of a very strong and excellent constitution, who had been deprived of the use of all his teeth, from this disease. He showed me about twenty, which were tolerably sound, and he stated, that about ten years had passed before the whole were lost.

During that period he suffered much pain, and enjoyed neither peace nor comfort, till he was deprived of every tooth; and he was so contented with the relief which the entire loss of his teeth occasioned, that my proposition to supply him with a set of artificial ones was rejected without the least hesitation.

In England, however, this malady is of exceedingly frequent occurrence, and I have had repeated opportunities of seeing it, especially amongst individuals who have returned, after residing for some time in the East and West Indies. During my short practice in London, not less than two thirds of the number of persons above the age of forty, who have consulted me, suffered from it in a more or less considerable degree, but in its incipient state it may be observed in individuals of almost every age after puberty.

This appears quite consistent with the peculiar tendency of the disease, to attack chiefly such subjects as possess vigorous health and sound teeth, and these, according to my observation, from the stimulant atmosphere of this country, and the wholesome nourishing diet generally enjoyed by its inhabitants, are much more frequent in England, than in any other part of the world.

OF THE SYMPTOMS

For a considerable time, even for many years, the symptoms accompanying this disease may entirely escape the attention not only of the patient, but that of a surgical attendant, not well acquainted with this disease.

The matter which is discharged, is, in the first stage of the disease, very trifling, and constantly removed by the saliva and by mastication; and the inconvenience and pain accompanying the malady are so slight, and the progress of it so gradual and regular, that it may sometimes go on, even for ten years and upwards before it is discovered, or the least suspected by the patient to be a source of danger and injury, either to his teeth, or to his general health.

Indeed, when it has already committed considerable ravages, and arrived at an advanced state, the local inconvenience and pain are generally far less evident and extensive than its morbid effects upon the general system; in consequence of which, the local disease is not unfrequently considered symptomatic, and again from this cause erroneously disregarded and permitted to proceed in its more rapid devastation.

When the malady has arrived at that state, however, when all the periosteum and alveoli, together with the gums, are more or less inflamed, considerable pains may sometimes affect the diseased parts, and the irritation produced upon the whole system is very great, and sometimes dangerous.

From that peculiar sympathy existing between the teeth and their relative parts, and between these and the general constitution, the whole nervous system is kept in a state of more or less excitement, and the same symptoms and nervous derangements, as are produced by dead roots and teeth, are very frequent consequences of the local disease.

Such teeth, however, as are so much deprived of their periosteum and sockets as to be rendered loose, produce even much more violent irritation upon the general nervous system, than such as are

dead and diseased; the malady, thus aggravated by many loose teeth is, in this advanced state, almost invariably accompanied by local and general symptomatic affections of some kind or other; viz. chronic pains in all the teeth and relative parts, rheumatism, pains and symptomatic diseases of those parts of the system, which are most nearly connected with the teeth and gums: such as, diseases and inflammation of the glands, soreness of the throat, various kinds of headache, pain of the face, tic douleureux, inflammation and diseases of the eyes, ear ache, defective smell and taste, and, not unfrequently, indeed, this malady is also accompanied with pains and affections in very distant parts of the body; as dyspepsia, and derangement of the alimentary canal, &c.

Indeed, so great is the morbid influence of this malady upon the general system, that after a perfect cure of the local disease has been effected, not only all these symptomatic affections subside, but the general health, for the first year or two, invariably improves in a most surprising manner, and the constitution recovers that natural strength and vigour, of which it had been deprived for perhaps ten or fifteen years.

This recovery, being dependent on the slow restoration of the healthy functions of the sockets and jaw-bones, which always labour under extensive diseased action during the local disease, is, however, so gradual as generally to deceive the patient as well as the medical attendant, and is consequently attributed to very erroneous causes, and I have, not infrequently, found the greatest difficulty to impress the patient with the only just and rational notions on the subject.

CASE XXVIII

In June 1815, I was consulted by two persons suffering from this cruel disease, Mrs. B-- from Bristol, and Mr. H-- from Binfield, both of whom were labouring under general nervous derangements and depression of spirits; the lady in particular had been afflicted at different times for more than five years, with almost all the symptoms of this malady in its most advanced stages.

I extracted eleven teeth from the mouth of Mrs. B--, and three from that of Mr. H--, and, by proper treatment of the local disease, the general health was restored to both, which they continued to enjoy when I had the last opportunity of seeing them.

CASE XXIX

Alexander Stuart, aged sixty four, had lost all his teeth from this destructive disease, except two upper, and one of the under cuspidati, which had been for some time very loose and painful. His sight had been declining for above fifteen years, and one of his eyes had been affected with incipient cataract for about five years. In January, 1814, he requested my assistance for some acute inflammation of his mouth. One of the above canine teeth, the principal cause of the inflammation, was immediately extracted, and at the same time I gave my opinion, that, by the removal of the other two, not only his mouth would be restored to perfect and permanent health, but, most probably also, very salutary effects might be produced with regard to his sight; in consideration of this, he consented to their immediate extraction.

My anticipation proved just, for by this treatment the disease of the mouth was perfectly cured in one or two days, and since that period not only has the general health of the patient been much benefited, but the pain and weakness of his eyes have greatly diminished, and their sight has gradually much improved.

October, 1815: The patient is now under the care of Mr. Lawrence, and by the humane and skillful treatment he receives from that excellent surgeon, not only will the left eye be perfectly cured, but great hopes are entertained of the complete recovery of the sight of the other, which was affected with cataract.

CASE XXX

Mr. J--, a gentleman of great respectability, a native of this country, but for many years a resident of Smyrna, aged about thirty-nine, had suffered upwards of ten years from this distressing malady, attended by all its torturing symptoms in a most unparalleled manner. His whole constitution, but particularly the glandular system, was so much affected as to produce swellings and indurations in the most distant parts, accompanied with great pain and inconvenience; but its effects on his head were frequently agonizing; indeed he assured, that so great were his sufferings, that he had been so far driven to despair, as to implore Heaven to relieve him by putting an end to his miserable existence. He repeatedly applied for the best medical and surgical advice that the country could afford; but the real causes of his sufferings were not detected; and such was the character of his disorder, that it baffled every exertion and all the remedies which were applied for many years. At length the effects of a sea voyage and a visit to his native country were proposed, and at the same time a trial of such remedial measures as he might be able to command in England.

Immediately after his arrival in London, this patient consulted Mr. Lawrence. This sagacious and disinterested surgeon soon suspected his teeth to be the chief cause of his malady, and recommended him to have my advice without delay, and to submit to any treatment I should deem necessary and proper.

On examining the gentleman's mouth I found his gums and all his alveolar processes more or less diseased. His double teeth, however, had most especially suffered: and so considerable a part of their sockets was destroyed, that their preservation was rendered altogether impossible. I therefore proposed their immediate removal; and, although the gentleman was exceedingly nervous, he acceded to my proposed plan of cure without the least hesitation.

February 14, 1826. Thirteen roots and teeth were extracted, and the mouth was subsequently cleansed with a gentle stimulant lotion every hour or two in the course of the day.

February 21st. The remaining front teeth of the upper and lower jaw were carefully scaled as far as the diseased state of their gums would allow of, and the patient provided with the means of preventing the re-accumulation of tartar. He was requested to continue the use of the lotion.

February 28th. The above operation was repeated, and cleanliness particularly recommended.

March 7th. The same operation was completed, and a perfect removal of the tartar was accomplished: the patient was also directed to proceed as before.

Thus by the judicious management of the case by Mr. Lawrence, and the above treatment, the patient was now, in less than one month, restored to perfect constitutional health. His mouth was rapidly recovering from a disease, probably of more than fifteen years standing; and the most important of his teeth were saved from total destruction, and permanently preserved.

He left London a few days after the last operation, to visit his relative in the country, full of spirits; and intending to return in a few months, to submit to some further necessary treatment to prevent a relapse of the disease of his gums, and then to leave England for his Asiatic residence with a vigorous constitution, and a mouth perfectly healthy and comfortable.

OF THE CAUSES

Amongst the remote causes of this disease may be enumerated a scorbutic and scrofulous habit of the gums, frequent and inordinate use of mercury, and narcotic medicines, great irregularities in the position of the teeth, neglect of cleanliness, improper manner of brushing the teeth, smoking and chewing of tobacco, too great indulgence in the use of spirituous liquors, operations of different kinds injudiciously performed, such for example, as the filing of the teeth when the general state of the mouth from an imperfect healthy action, is not capable of bearing the unavoidable irritation which it occasions, or where too great violence is used in this operation even in a healthy state of the mouth; the operation of scaling the teeth imperfectly and unskilfully performed; and the use of certain objectionable tooth powders, such as charcoal, from the irritation which it mechanically excites in the gums by its cutting quality, &c.

By the above causes a collection of tartar, without which I have never seen the disease, is deposited upon particular parts of the teeth; and this becomes the immediate exciting cause of the disease; and so long as it is suffered to remain, entirely prevents the success of such efforts as nature or medicine may make for the accomplishment of a cure.

When the disease has advanced so far that some of the teeth have become so much exposed as to be loosened, they prove another and a very powerful aggravating cause; and the disease may be considered to be in its most violent stage, and gradually advancing to its crisis. From the constant increase of these causes, all the teeth will gradually become loose in the same proportion as they come out one after the other, until in a period of from five to ten years, by the removal of all of them, a perfect cure is effected by this protracted diseased action; unless the constitution is previously worn out.

OF THE METHOD OF TREATMENT

I have always succeeded in curing this disease in all its different stages by the mode of treatment, which I am now about to describe.

It consists, first, in checking the diseased action which has become habitual, and in producing a general healthy disposition in the diseased parts, and those connected with them, by removing the actual causes; and, secondly, in preventing their recurrence.

The first object is obtained by extracting those teeth, of which the periosteum and alveoli are too much affected by the disease to be capable of permanent restoration, and by a complete removal of the tartar and glutinous matter covering the remaining teeth and their exposed necks, which produces the irritation in the alveolar processes.

The second indication will be answered by removing such remote causes as may still exist, or, if this cannot be done, by counteracting their influence. When these are of a general nature, as scurvy, scrofula, or the effects of mercury, constitutional remedies combined with topical means are required. When local, however, that treatment only, to which I now beg to draw the particular attention of the reader, is demanded.

The remedies to be prescribed for the removal of the local causes mentioned, are of very great importance, and require the most particular and decisive consideration.

Such teeth as excite constant irritation from their unnatural irritation, either on the opposite teeth or on the gums and alveoli, should be removed, or the effects of their irregularities prevented.

Operations injudiciously performed require such remedies as will remove the injurious effects resulting from them. When the individual has been neglectful in cleansing the teeth, or when this has been done in an improper manner, great attention is required on the part of the dentist to prevent the accumulation of tartar.

With the foregoing measures may be combined the use of some astringent or tonic washes, such as dilute tincture of peruvian bark, or myrrh, which I have found very serviceable; but all powerfully stimulant tinctures should be avoided altogether, or used with the utmost caution and judgment.

Considerable experience and skill are required to distinguish at once between those teeth which are capable of preservation, and such as ought to be extracted: inasmuch as the principal curative means for this disease are the removal of teeth, so much injured as to have become a directly exciting cause of its farther progress, as well as of those which, from a variety of circumstances, operate as indirect causes and must unavoidably become, in the progress of time, sources of irritation and of a morbid condition of the surrounding parts. The disease being so far advanced as to render it necessary to extract some of the teeth, this operation must precede every other remedial attempt; since, by omitting this a cure is impossible, and all other operations will not only prove fruitless, but will have an immediate tendency to increase the irritability of the affected parts, and the violence and rapidity of the disease itself.

It is hence a matter of considerable importance to establish some guide, as far at least as the

intricacy of the subject will allow, by which we may be directed in deciding in those circumstances, whether we should extract the teeth, or make efforts to preserve them.

The incisors and cuspidati being the most important teeth, the main attention is always to be directed to them. They are, fortunately, from their natural situation, and from their peculiar formation and functions, capable of suffering longer from this disease without being destroyed than any of the other teeth. They may, indeed, be preserved even when not more than one half of the alveolar processes remains, provided that a considerable portion of the fang continues united to the alveolus by its periosteum. I would always endeavour to preserve these teeth, unless indeed they were very loose. Where more, however, than one half of the alveolar cavity is absorbed, or when the tooth is very loose or has lost its vitality, it must be extracted for the benefit of those adjoining.

The bicuspids and molares are much less capable of being preserved than those just mentioned, and the process of mastication causes a greater mechanical irritation. They are also more inconveniently situated and formed, and generally have several roots; in consequence of which the difficulty of keeping them free from tartar is much increased. Hence they should be extracted: first, when they are very loose; as I consider teeth, in this state, a direct cause of disease from the constant irritation which they occasion in the alveoli; secondly, when the alveolar processes have receded from them so much as to expose the spaces between the fangs of the tooth; as it will then be impossible to prevent the accumulation of tartar in these places, by which these teeth are rendered such causes of the malady as must inevitably augment the inflammation. Moreover, the suppuration cannot fail to be kept up by the irritation of the tartar, until the tooth becomes loose, and is thus rendered both a direct and an indirect exciting cause of the disease.

Not one of the molares should be permitted to remain that has no antagonist, particularly if it is situated in the upper jaw; inasmuch as such teeth being deprived of that necessary stimulus which arises from mastication, their periosteum soon becomes relaxed, and consequently predisposed to this disease: besides, the utility of such teeth being lost by want of an opposing surface to act against, they influence the surrounding parts like extraneous bodies.

Should there be, for instance, an interval between two opposite teeth when the jaws are closed, nature uniformly attempts to remedy the evil; and for this purpose the cavity of the alveolus contracts at the base, and drives out the tooth until it meets its opponent, by which the necessary stimulus is restored and the morbid action cured. In this manner the loss of one molar tooth produces the destruction of its remaining antagonist. This is effected, however, after a struggle of nature, of very long duration which will always involve, in some degree, all the other teeth in a like diseased condition; it is necessary, therefore, to prevent this morbid action, particularly pernicious in this disease, by the extraction of the tooth, or any molar tooth so situated.

Every tooth which has lost its vitality, including all stumps, and all such teeth as from their irregular situation or direction excite a mechanical irritation, provided this irregularity cannot be remedied by filing, or by cutting away the irritating parts, should also be removed.

All operations should be performed with the greatest judgment and caution, and all teeth to be removed must be extracted at the same sitting, because it would either partly or altogether obviate the desired effects, if this particular operation were performed at different times. This advice is the result of much experience, and should if possible, be always adopted to ensure a successful cure.

The bleeding from the sockets should be encouraged by warm water taken into the mouth at short intervals, during the different operations, and continued for some time; as its effects are of much importance.

A gentle astringent wash may be subsequently employed for several days. I have generally found the following simply preparations the most useful.

Take of clarified honey, three ounces, and of vinegar, one ounce. This diluted in the proportion of three tablespoonfuls to a pint of warm sage tea, or water, may be used frequently during the day.

Take of clarified honey and of the tincture of bark, two ounces each. Mix and dilute as above.

Take of honey and of the tincture of rhatania, two ounces each. Mix and use as above.

Take of honey and the tincture of myrrh, two ounces each. Mix and use as above.

Take of honey and of the tincture of catechu, one ounce each. Mix, dilute, and use as above.

In about ten or fourteen days after the removal of the teeth, the inflammation considerably subsides, the gums assume a more healthy appearance, and the teeth become firm in their sockets.

The tartar should now be removed; but there is often much difficulty in doing this well. It adheres so firmly to the neck or roots of the tooth, which are generally loose, and it is attached so closely to the alveolar processes, and is in many cases so covered by the edges of the gums, and so hidden between the teeth, that it is not without the utmost care that we are able to avoid irritating the gums and periosteum with the instruments employed. The operation, on this account, is to be performed with great caution and tenderness, in order to effect a perfect removal of the tartar without making the teeth still looser. Instead of believing that the removal of all the tartar at the same time can endanger the teeth by exposing them, as is erroneously asserted by Mr. Fox; it seems to me, that the sooner they are relieved from so pernicious a coating, the more we contribute to their preservation; yet we are in this case often under the necessity of contenting ourselves with the removal of only a portion of it at a time, and of the remainder by two or three future operations, after a lapse of eight or ten days. As the tartar is most injurious in those parts where it presses upon the alveolar processes, it is highly necessary that every particle of it should be removed from those places.

After the stony matter, or hard tartar, has been taken away, the removal of the green mucus is an important part of the operation. This cannot be effected with instruments. It may be done by dipping

a piece of thick leather, or soft wood, into some dissolving tooth-powder or liquid, and then rubbing the surfaces of the roots and crowns of the teeth with it, to be followed by the use of a soft brush.

The dentist's care is now to be directed to the prevention of the re-accumulation of the tartar; for a perfect cure depends not only on the entire removal of the tartar, but also on the permanent prevention of its recurrence.

To effect this purpose satisfactorily, is an arduous task. There is always much predisposition to form new tartar, and the difficulty of preventing it from settling on the teeth and fangs, is augmented by the great irritability and tenderness of the gums, the debilitated state of the periosteum, and the inflammation of the alveoli. The frequent repetition of scaling the teeth with instruments cannot prove a substitute for the duty of keeping them constantly clean; on the contrary, it has a tendency to produce repeated irritation, and the benefit, to be derived from the operation, cannot be obtained without proper care afterwards. Mechanical means alone, are, for the most part, either insufficient for this purpose, or too violent: and powerful chemical means are apt to occasion destructive diseases of the teeth themselves. The only method, therefore, which remains is to use these means together, by which the bad effects of both may be avoided, and their advantages combined.

The rule to guide us in applying these remedies is, that the more the disease has advanced, the more the chemical agency is indicated, and the more carefully is the mechanical power to be applied.

After the scaling of the tartar from the teeth, the patient must clean them every morning, and after every meal, with an astringent powder, possessing a sufficient dissolving power upon the tartar in its soft and early state, and with a brush as hard as can be used without producing much pain and irritation. After this process has been continued about a month, and the re-accumulation of tartar found to be completely prevented, the powder should be used morning and evening only, and the brush and water after every meal. The brush used should be harder, in proportion as the health of the parts improves, and so formed as to clean between the teeth, and to give a mechanical stimulus to the gums; which is highly beneficial to these parts.

The internal gums are considerably harder, and less irritable than the external; a fact not hitherto noticed, as far as my observation extends, and the tartar accumulates much more rapidly on the inner, than on the outer side of the teeth; hence, a different brush is required for each surface: that for the internal, should be made of fine and select hog's bristles, and cut in a conical form, about three-fourths of an inch in length; and that for the external, is to be made of an oblong shape, of the best white horse-hair, and cut about two-thirds of an inch long, somewhat to the edge; and both, as the disease decreases, may be used a little shorter and harder.

The patient should be directed to press against the gums and teeth with the brush, as hard as he can bear, so that the bristles may enter between the teeth, and between the edges of the gums and the roots of the teeth. The pressure of the brush is to be applied in the direction from the crowns of the teeth towards the roots, so that the mucus, which adheres to the roots under the edges of the gums, may be completely detached, and, after that, removed by the friction in a direction towards the grinding surfaces. This mode of brushing the teeth, which I direct to be adopted, is entirely the reverse of that recommended by every writer on the subject, whom I have consulted. They all advise the brush to be applied from and over the gums towards the teeth, the consequence of which is, that the tartar remains fixed close to the alveolar processes, and that some mucus is pressed into the spaces at each brushing. The intention they have in advising the brush to be used thus, is, to excite the gums to grow over the roots again; but, instead of effecting this, much injury will follow such practice.

There is a natural tendency in the edges of the gums to recover their place, provided everything obstructing this effort is always removed; but when the sockets and periosteum are destroyed, the detached covering of the gums is very injurious, and can only be reproduced by allowing the edges or processes of the gums to become diseased, and so much inflamed as to form an unnatural increase of these parts, similar to excrescences; this is generally the result of some local irritation, such as tartar or caries, by the irritation of which the absorption of the alveoli proceeds very rapidly, and without interruption.

Mr. Hunter considered that good effects resulted from repeatedly scarifying the gums. Mr. Fox also thinks that great benefit arises from this operation. To me it has always appeared to afford temporary relief only, and to be of no real benefit in permanently arresting the progress of the disease. It should, I think, be discarded; since, though palliative in its immediate tendency, it will occasion delay in the use of a more efficacious treatment. By the extraction of one tooth, when its removal is really indicated, more benefit arises than from fifty scarifications: and if the disease be not so far gone as to require the extraction of any teeth, the immediate removal of the tartar has the same effect. If there is an inflammation in the gums, the mere unavoidable pressure of the instruments on them in scaling the teeth, must occasion some bleeding; which, together with the exciting cause, the tartar, is much better calculated to remove the inflammation than repeated scarification.

The common practice of fastening such teeth as are very loose, by ligatures to the contiguous teeth, as recommended by Fox, is also very injurious, and should never be resorted to, even in such cases where a radical cure cannot be expected. Teeth which are fit for preservation will grow firm by restoring the tone of their periosteum, and the other surrounding parts; and this is to be effected by the remedies already indicated. The ligature not only prevents such teeth from becoming firm, but also tends to loosen those to which they are attached. The gold wire, however thin and pure it may be, has not sufficient elasticity to permit the loose teeth to grow in their natural situation, or to be applied without producing some irritating pressure on the gums and the periosteum of the adjacent teeth. If of silk, the ligature will shrink

when it becomes wetted with the saliva, and thereby create a constant straining upon the teeth, and hence upon the diseased parts also.

The operations which are necessary to be performed upon decayed teeth, such as plugging, filing, or cutting out carious parts, must be deferred until the parts have acquired sufficient health and vigour to support the irritation which they cause. I have generally delayed these operations for three months, as an attempt to perform them too early, may not only bring on a relapse of the disease, but also prevent the successful result of the operations.

The introduction of artificial teeth should, if possible, be avoided, and made use of in these cases only from imperious necessity; when they should be prepared with the greatest care and accuracy, in order to prevent any injurious mechanical influence upon the gums, and those teeth which come in contact with them.

For a more particular description of the treatment of this disease, I beg the reader's attention to the following Case.

CASE XXXI

On the 3rd of May, 1818, Mr. M. of Baltimore, consulted me on the subject of his teeth. On examination, I found that he had suffered a considerable devastation of the gums. Nearly half of the sockets of the incisors and cuspid teeth of both jaws were destroyed, the upper somewhat more than the lower; the teeth were rather loose. The sockets of the second molar teeth of both jaws, also had suffered almost as much as those of the incisors. The latter were not loose; but the partitions of the alveolar cavities between the roots were sufficiently absorbed to allow a passage to a probe between the roots. Those of the upper dentes sapientiae were not so much injured; and their antagonists, the two lower dentes sapientiae, were the only teeth which the patient had lost. The sockets of the bicuspid and of the first molar teeth had suffered less than any other. Their roots were exposed about one eighth of an inch. The gums were slightly inflamed, and there was a small discharge of a whitish matter all around their edges, from between the fangs of the teeth and the edges of the gums.

The patient had always paid great attention to cleanliness; and there was not, therefore, much tartar on the teeth; yet they were not entirely free from it, particularly the fangs, to which there was a considerable portion adhering close to the edge of the sockets. The teeth were all tolerably healthy, and only one had been painful. They were well and handsomely formed, and regular in their position, with the exception of the first under bicuspid tooth on the right side which was pressed outwards, and which, therefore, acted unnaturally upon the opposite cuspid and first bicuspid.

The gentleman was about thirty-two years old, of an excellent constitution; and he had never, to his recollection, been seriously ill for a single day.

About three years previously to his consulting me, he applied for advice to one of the most respectable dentists of Paris, who, after examining his teeth, told him that his mouth was labouring under the consequences of venereal affection, and advised him to apply to a physician. The gentleman, however, assured him that it was impossible, as he never had the slightest taint of a venereal character. The dentist persisted in his assertion, and told him that the state of his gums rendered his opinion altogether certain, whatever the patient might declare to the contrary. Disgusted with such ignorance and presumption, the gentleman left him, but neglected to take any further advice.

Several weeks before I saw him, he was obliged, by a violent tooth-ache, to apply to a dentist of Baltimore to relieve him from this distressing affliction. The dentist, however, refused to extract the tooth, alleging that its removal was unnecessary, as he would, in a few years, lose all his teeth. The gentleman forgot his pain, left the dentist, by whom he was much alarmed, and resolved to consult me on the subject, which intention was immediately communicated by letter. When I saw him, I conceived that I hazarded nothing by asserting, that I had great hopes of preserving all those teeth which were most important. I found him perfectly willing to submit to any plan of cure I should think proper to adopt.

I therefore extracted the two upper dentes sapientiae which had lost their antagonists, the four second molar teeth, of which the roots were so much exposed as to preclude every hope of success in attempting to save them, and the first bicuspid of the lower right side, of which the irregularity has been noticed. After the operation, warm water only was freely used until the next day, with a view to excite the salutary bleeding from the sockets.

When I saw my patient again, he was entirely free from pain: the bleeding which succeeded the operation, had removed the inflammation of the gums, and he felt so well that I did not hesitate to comply with his request to proceed on the next day with the operation, as he was anxious to return to Baltimore. Conformably to this design, I carefully removed the tartar from his teeth, and on the subsequent day he left the city to return home. I was afterwards informed that he was in good health, and I did not see him for a long time. The disease was entirely removed, his teeth had grown firm, and the gums were free from inflammation. From the absorption going on in the sockets, from which the teeth had been extracted, he had not been able to keep them perfectly free from tartar, and a second operation of scaling his teeth became necessary, which took place about one year after the former treatment.

His teeth were perfectly clean, and the gums and sockets were quite healthy in the month of September, 1819, when one of them was plugged with gold, and the carious parts of the incisors cut and filed out. I provided him with tooth powder, and requested him to observe rigid exactness with regard to cleanliness. Since that time I have frequently heard from him, and without complaint.

THE HISTORY OF VINCENT'S INFECTION*

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EARLY HISTORY

DETERMINATION of the antiquity of systemic conditions rests upon the examination of literary or physical remains. Since early primitive men left no literature, examination of their skeletal remains is the only means left to us for discovering evidences of the diseases to which they were subject. Since fuso-spirochetal gingivitis and stomatitis is essentially a disease of soft tissues, we must naturally look to literary sources for evidence of the disease. In the absence of written records, however, it is not unreasonable to assume that ancient man did suffer from this infection since modern primitives untouched by present-day civilization are known to suffer from the malady even in epidemic proportions.[1] The earliest written material left to us on disease generally are the various Egyptian *Papyri* and some writings of the ancient Chinese and Hindus. The Egyptian *Papyri* do not reveal any hints of pseudo-membranous stomatitis. The words "ulceration" and "fetid breath" appear in Indian and Chinese descriptions of various oral ailments, but symptoms of diseases have been incoherently muddled and their identity lost.

Vincent's infection may have occurred in Greek times, as in our day, among soldiers. Xenophon[2] states, in 401 B. C. that many of his soldiers, on their retreat from Persia, were affected with sore mouths and foul-smelling breaths. Since general bodily affection is not mentioned, the presence of scurvy may here be doubted.

Perhaps the only allusion in the Roman medical literature to this condition is that by Cornelius Celsus[3] in the first Christian century, who mentions treatment and symptoms of noma, the malignant form of the disease in children. Evidence of Vincent's infection occurs in the Roman lay literature. Strabo[4] mentions an outbreak of "stomakake" in the Roman army under Aelius Gallus in Arabia and Pliny[5] talks of the same condition in the army under Germanicus. Although the nature of this condition is not known, it may have referred to the oral symptoms of scurvy, as some commentators believe, but might just as well have been "trench mouth" since there is no mention of body debility. Another instance of Vincent's infection may be inferred from a description of a fatal case of noma in a 6 year old child, which Martial,[6] the Roman Poet, (first century, A. D.), includes in one of his *Epigrams*. These few references will need to serve here for the whole period of Roman times.

The main sources for material of a medical nature during the early and late Middle Ages are the writings of the Arabian physicians. Although mention of dental and oral ailments is frequently distributed throughout their texts, an exact description of Vincent's stomatitis is yet to be found in them. Contemporary accounts of the crusades by Jaques de Vitry[7] and Joinville[8] reveal that scurvy was quite prevalent among the crusaders. Detailed investigation into such lay accounts of the period may reveal that the presence of Vincent's infection was recognized by these chroniclers. Most of the medical writings of the Middle Ages with their adherence to the Galenic system of medicine, do not offer much opportunity for interesting findings in relation to oral conditions during this period.

When long sea voyages became common at the beginning of the 15th century, reports of scurvy became prevalent. So great a hold did the disease take on the minds of medical writers of that time that most of the practitioners, on account of their lack of knowledge, described almost all mouth ailments as "scorbutic." It is impossible in the mass of this literature to differentiate from one another the various oral disease

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conditions which may have symptoms similar to the mouth lesions of scurvy. But it is not at all improbable that many cases of Vincent's infection were incorrectly described as scurvy.

HISTORY SINCE THE SEVENTEENTH CENTURY

During the Seventeenth Century, the presence of noma was noted and described by a long line of Dutch physicians under the names of "cheilokake," or "cancer aquaticus." The earliest of those to mention it was Von Hilden[9] in 1611. Battus,[10] however, in 1620, was the first to treat the subject at length. Fleming[11] states that no less than a hundred papers on the subject appeared from the time of Battus' paper in 1620 to 1832. Many of the writers on the subject were able to recognize the early ulcerative gingivitis, which usually precedes the appearance of the large sloughing cheek ulcers. In most instances, the dramatic appearance of noma made the physician overlook the less spectacular forms of Vincent's infection which occur in the mouth.

The first clean-cut clinical picture of the disease as differentiated from periodontoclasia and the oral symptoms of scurvy was made by John Hunter[12] in 1778. He states that "the gum between the teeth swells as well as the edges," and becomes tender and bleeds upon every occasion. The inflamed gums often ulcerate so a common ulcer is present over the gums in many cases. Any portion of the entire gingival tissue in both jaws may become infected. This acute observation is one of the many, of dental importance, made by Hunter.

From this time on, descriptions of the disease appear with increasing frequency in the English and American dental literature. Apparently, writers of text books copied Hunter and by virtue of his clear description and differentiation, led the way to more frequent recognition of the condition.

In the Nineteenth Century, the most prolific writers on the disease, as it occurred in both children and adults, were the French medical clinicians. They were apparently not acquainted with Hunter's writings and thought they were the only ones to have described the condition in their time. Desgenettes[13] first described it in 1793-1794, as occurring in the French army during the Italian campaign. Napoleon's famous army surgeon, Larrey,[14] next described it in the army in 1807. From this time on, no fewer than forty publications in the French literature mentioned the condition as a common ailment among soldiers. Pediatricians in

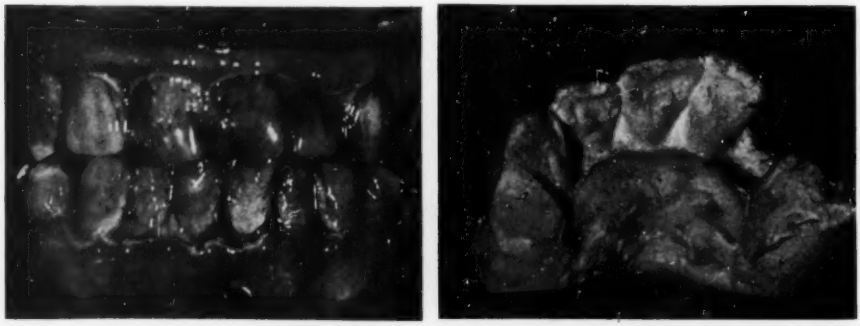

FIG. 1. (Left.) *Acute destructive* Vincent's infection. Typical picture most frequently seen during and immediately after the World War period. Note gray necrotic line at the base of the lower anterior papillae, outlining one large lesion formed by the coalescence of the spreading interproximal lesions. Note also the hemorrhage, more or less spontaneous, from the septal gingivae on the left side. When the necrotic interproximal papillae were wiped away, the gingivae had essentially a punched-out appearance, similar to that shown in Fig. 2.

(Right.) Photograph of a cast showing the typical appearance of marked destruction in cases of Vincent's infection frequently seen during and after the World War period. Note the deep trench-like groove behind the anterior teeth caused by the destruction of the septal and lingual gingivae. This resulted in the marked denudation of the root surfaces and in the edentulous appearance of the palate. In most cases, after successful treatment, such grooves tend to slowly fill in, but the septal gingivae seldom, if ever, reform.

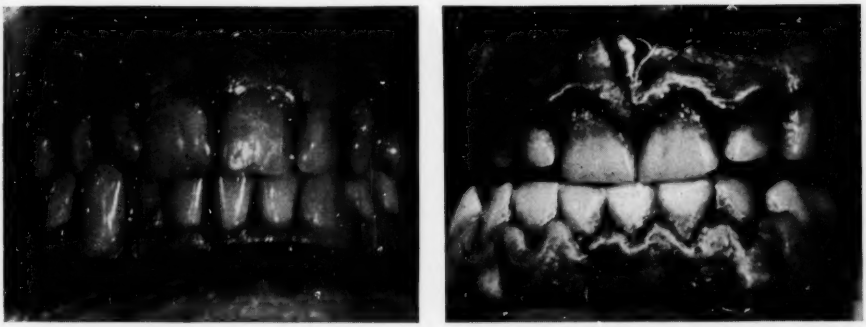

FIG. 2. (Left.) *Acute destructive* Vincent's infection prevalent at this time. Note the punched-out appearance of the septal gingivae and the gray necrotic border outlining the area of destruction.

(Right.) *Acute hypertrophic* Vincent's infection. This is different from the destructive type in that the entire gingiva is hypertrophied. It, too, is tender, bleeds easily, and is outlined by a necrotic border, especially noticeable in the upper jaw in this case. (The other white markings are merely highlights in photography.) The hypertrophy, like the other symptoms, is usually of recent onset and tends to disappear rapidly in response to routine anti-Vincent's treatment. This type, like the subacute hypertrophic condition, was not seen as frequently during the World War period as in subsequent years and was therefore referred to as "atypical."

France, Germany, England, and America described Vincent's infection in text books as occurring in debilitated children. It remained, however, for Bergeron[15] in 1859 to point out, that the disease which occurred commonly in French soldiers was the same condition that appeared sporadically in the adult civil population, and *frequently* in children. His treatise on *The Ulcerative Stomatitis of Soldiers and Its Identity with the Stomatitis of Children* is today an unrecognized classic in the field of stomatology. He analyzed almost all the French writings on the subject before his time, and made elaborate inquiries to find out why the disease was not recorded as occurring in European armies other than the French and Portuguese. He erred, however, when he stated that it was uncommon among sailors, for a long list of publications on this condition in the French navy[16] began to appear just as his book was published. The few German references at this period are mostly on its occurrence in children. The German writers usually credit the French with having brought it to their attention. American dentists of the early Nineteenth Century do not appear to have made any original observations concerning the condition. Coates,[17] an American physician, described cancrum oris as it appeared in a Philadelphia asylum for children in 1824. He very clearly describes a gingivitis which occurred in these children as "mild" and "chronic," but which on occasion flared up into a full-grown ulcerative gingivitis, and in very debilitated children developed into a fatal noma. This was apparently a unique report in the American literature of the time, since Fitch,[18] the author of a book used extensively by contemporary dentists, and an omnivorous reader, did not note other reports of the condition in America up to 1835. Later, during the middle of the Nineteenth Century, several references to the occurrence of noma are made in our American dental literature.[19] All these writers were later apparently overlooked, for Gilmer,[20] and Weaver and Tunnicliff[21] in writing of acute ulcerative stomatitis at the beginning of this century, did not quote any of these early reports.

Again, in turn, when the disease broke out in epidemic proportions during the World War, the reports of Gilmer,[20] and of Tunnicliff and Weaver,[21] were overlooked, as well as the previous literature of the Nineteenth Century. Many claimed that the disease had been a rare condition before 1914, and peculiarly enough, despite the

wealth of literature, some of our contemporary writers believe that the disease was unknown before the World War. The acute observations of those early writers were lost sight of, and many opportunities to benefit from their work were missed.

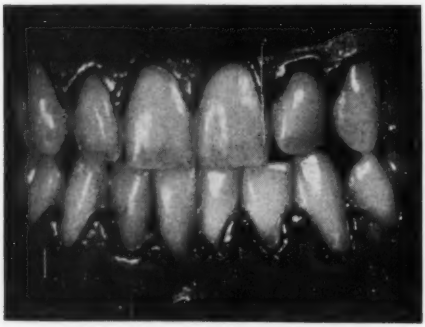

FIG. 3. *Subacute hypertrophic* Vincent's infection, seldom seen, and less often properly diagnosed, until several years ago. The septal gingivae are edematous and enlarged, red and glossy, bleed easily, but are not quite as tender as in the acute condition. There is no evidence of necrotic tissue. The papillae react readily to routine anti-Vincent treatment with resultant return to normal outline.

LANDMARKS IN THE CLINICAL DESCRIPTION OF THE DISEASE

As has been pointed out, it was possible to surmise reports of Vincent's infection in very early literature only when such oral symptoms as ulceration, soreness and fetid breath, were described without any reference to systemic disorders. During the Sixteenth and Seventeenth Centuries, additional significant symptoms of Vincent's infection, such as gingival inflammation and hemorrhage, are mentioned incidentally in descriptions of noma. Hunter[12] in 1778, indicated that the interdental papillae may swell and become very tender before ulceration occurs; that the gingival margin may lose its smooth contour, and swell when the gums first become tender. These are fine diagnostic points indicating that comparatively mild gingival symptoms may be the precursors of an acute Vincent's infection. Hunter noted that the disease may occur in people who are in all other respects healthy, as well as in children "evidently in a scrofulous habit."

Descriptions of the acute condition in groups of debilitated children and among soldiers in the French army during the Nine-

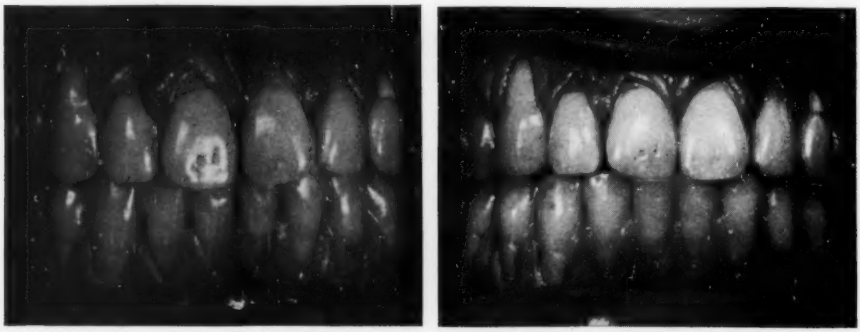

FIG. 4. (Left.) *Subacute* Vincent's infection associated with and partly fostered (but not caused) by a traumatizing form of tooth brushing. This is quite typical of the infection when it occurs in those who brush enthusiastically but unwisely. The septal gingivae become heavy but shortened and their points rounded. However, as a result of the habitual hard brushing, their labial aspect retains the normal pink, stippled appearance. These papillae tend to divide into a labial and a lingual segment with a tender, inflamed, and bleeding cleft between them. In this particular case, the upper papillae essentially are involved. Note that the hypertrophy of the central septum has temporarily forced the incisors apart.

(Right.) Same as left, photographed several months after routine anti-Vincent treatment and instructions in improved brushing technique. Note that the upper papillae especially have returned to their original length and contour and that the upper incisors are no longer interspaced. Note also the return of the receded labial gingival margins toward their normal position.

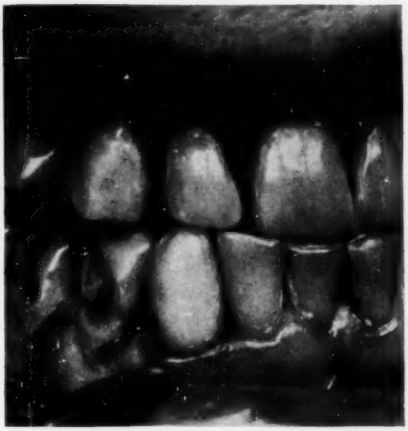

FIG. 5. (Left.) *Subacute destructive* Vincent's infection, especially marked on both sides of the lower right cuspid. Although the patient brushed sufficiently hard to produce a decided "wasting" of the teeth, he omitted the interproximal areas, thereby entirely depriving them of the beneficial hygiene and stimulation in the brushing procedure. Thus they were easily predisposed to the infection.

(Right.) Same, several months after the successful treatment of the infection, showing the return of the septal gingivae to their original texture and contour, and forming a single solid papilla which replaced the separate labial and gingival segments caused by the destructive action of the infection.

teenth Century have been mentioned. In essence, most of the clinical descriptions concur in more or less detail with those of Hunter. The previously mentioned observations by Coates[17] of the chronic mouth condition existing among American asylum children, were not noted by any of the writers of that period, except Fitch.[18] It remained for Bergeron[15] to bring out the fact that the disease exists not only in an acute form, but that untreated acute cases may lapse into a chronic condition (Figs. 5 and 6) which may or may not have acute exacerbations. He evidently deserves credit for being the first to bring out these clinical variations of the disease. He also pointed out that the acute condition may recur in persons who were apparently cured of the disease at some previous time. It was not until the present century that such conditions as described by Bergeron were again recognized.

An excellent description of Vincent's infection, summing up the writings of the Nineteenth Century clinicians, was made by Hirsch[22] in 1886. His account includes such diagnostic points, not mentioned by Hunter, as the drooling of ropy saliva, enlarged submaxillary lymph nodes, fever, and general malaise. These are given as concomitant symptoms with fetid breath, bleeding, painful gums and pseudo-membranous ulcers.

From this time on, fine descriptions of the acute condition appear in the literature with fair regularity. It remained, however, for Gilmer, in 1906, to point out that the interdental papillae were almost invariably affected and their loss gave the gums their characteristic gnawed-out appearance (Fig. 2, Left): a sign which today is recognized to be of prime importance in diagnosis of the destructive type of this condition. In the same year, Weaver and Tunnicliff pointed out that sometimes "the lesion is slight and may be found accidentally."

THEORIES AS TO ETIOLOGY

All of the early practitioners were of the impression that some form of bodily predisposition to the disease existed. They could not help but remark about the frequency with which it occurred in debilitated children, whether as a result of "poor hygiene" as they termed it, or as an aftermath of some severe childhood disease. ("Poor Hygiene" was the term used for poor nutrition in combination with squalid living conditions generally.) The occurrence of the disease among soldiers led to

much speculation as to why *they* were so subject to it. Bergeron[15] investigated it from the angles of diet, use of tobacco, weather, living quarters and age. He thought that the reason only French troops showed the disease and not others, was that their diet was so monotonous. He pointed out that the officers were not subject to the disease, that his cases were about equally divided between users and non-users of tobacco and that the condition occurred in soldiers of all ages, in all seasons.

Various opinions were expressed by many of the writers as to seasonal incidence, and age and sex predilection for the occurrence of the disease. At one time,[28] a considerable group held that the disease became prevalent with the eruption of the third molar. This is an interesting example of an observation which foreshadowed recognition of an incubation zone. Further indications that predisposition was an important factor was suggested in the writing of the early Nineteenth Century clinicians when they stated that ulcerative stomatitis occurred in mercurial poisoning and in scurvy. More recently, the occurrence of Vincent's infection has been associated frequently with various blood dyscrasias and vitamin deficiencies. A rather complex, but still unknown type or types of predisposition to the disease, is thus indicated.[24] The complete story has yet to be told.

BACTERIOLOGIC STUDIES

Leeuwenhoeck,[25] in the middle of the Seventeenth Century, stated that "there are more animals living in the scum on the teeth in a man's mouth, than there are men in a whole kingdom, especially in those who don't ever clean their teeth." This was the first appreciation of the role of filth in relation to the number of bacteria in the mouth. It is interesting to note that as far back as 1856 material from ulcerative stomatitis was examined microscopically by Robin and Lhuys at the suggestion of Bergeron.[15] They observed motile organisms which might have been fuso-spirochetal bacteria. Miller[26] states that both Pasteur and Netter noted the presence of spirochetes in ulceromembranous stomatitis. The first clear description of fusiform bacilli and spirochetes, as they occurred in ulceromembranous gingivitis of children, was made by Früwald[27] in 1889. Between this time and 1896, descriptions of a throat infection were made by Veillon[28] in which he accurately described the presence of cocci, leptotrichia, vibrios, spirochetes, and fusiform bacilli. In the same year, Plaut[29] described spirochetes and "Miller's bacillus" in the same disease. "Miller's bacillus" is now thought to be spirillum *sputigenum.*[30] Vincent[31] published his work on hospital gangrene in 1896, and associated the fusiform bacilli and spirochetes found in lesions of this condition, with those of the gangrenous throat ulcers. He was the first to emphasize the constant association of the fusiform bacillus and spirochetes in these putrid lesions. Bernheim,[32] in 1898, first pointed out that the bacteriologic picture of the angina and of the gingivitis were the same.

During this same period, Seiffert,[33] Perthes,[34] Sobel and Hermann,[35] and Tunnicliff[36] contended that the fusiform bacillus and spirochete were different forms of one

FIG. 6. *Chronic destructive* Vincent's infection resulting, in this case, in deep interproximal *(not approximal)* pockets particularly marked in the upper jaw. This condition is often described by dentists as "dry pyorrhea" because pus cannot be expressed from the pockets. These are usually bounded mesially and distally by the root surface of the adjacent teeth, and labially and lingually by the labial and lingual gingival flaps. Furthermore, even slight manipulation of a blunt explorer at the bottom of such a pocket produces marked tenderness and hemorrhage, which is not the case when the pocket is pyorrheal. This condition responds favorably to anti-Vincent treatment. Usually the missing gingival septum is restored up to the level of the labial and gingival flaps, thus forming a solid mass of gingival tissue. Occasionally, the regeneration is even more extensive.

organism. Perhaps Tunnicliff's latest discussion of the problem[37] where she indicates that a spirillary dissociant of the fusiform bacillus exists, may clarify the problem of the identity of the spirochetes and other spiral forms found in these lesions. Thus, two types of fusiform bacilli may occur in a lesion, the bacillary form or its spiral dissociant, in addition to the commonly occurring spirochetes.

With the advancing years, and increased skill in bacteriologic technique, it has been possible to investigate the pathogenic properties of these bacteria in experimental animals, and it has been found by Smith,[28] and Proske and Sayers,[29] that the typical fusospirochetal lesion is produced by the symbiotic action of the following four organisms, an oral spirochete, a fusiform bacillus, a vibrio, and a streptococcus.

With the advent of bacteriologic investigation of Vincent's infection, smears from the lesions have been widely used as a diagnostic aid. Sobel and Hermann[35] wrote at the turn of this century that a diagnosis of Vincent's angina could not be depended upon from cultures since no satisfactory culture media for the growth of fusiform bacilli in uncontaminated form had been found. Weaver and Tunnicliff,[21] six years later, considered that smears from the exudate of the diseased area, showing the presence "of the characteristic fusiform bacilli," would be sufficient evidence for a diagnosis of Vincent's infection, although they do say that these bacteria are not the essential etiologic agents. Since then, this means of diagnosis has been accepted and advised by many. Opponents to the use of the smear as a means of diagnosis have pointed out that the fusospirochetal flora, has been observed in normal mouths, and therefore, a smear alone is unreliable. Yet, there is no agreement on this aspect of the problem. Some writers believe that from the clinical findings a tentative diagnosis is made, but confirmed by microscopic examination. Hirschfeld,[40] in 1923, presented abundant evidence to show that there are sufficient pathologic changes in the gingival and other tissues of the mouth to diagnose Vincent's infection without the use of microscopic slides. Carrying the means of diagnosis one step further, he pointed to a therapeutic test. Corroboration of the diagnosis is achieved by placing the patient on anti-Vincent treatment; if the condition responds favorably to the treatment within 24 to 48 hours, the diagnosis may be assumed to be positive.

LANDMARKS IN TREATMENT

Earliest treatment of oral disease was highly empirical, to say the least. Such methods of treatment as rinsing the mouth with urine were prevalent even unto the beginning of the Nineteenth Century.

During most of the Nineteenth Century, caustics were the favorite drugs used locally in the treatment of Vincent's infection. Tannic acid, silver nitrate, nitric acid, a mixture of muriatic acid in honey, and carbolic acid were most commonly mentioned. It is interesting to note that potassium chlorate was extensively administered as an internal therapeutic measure and furthermore claimed to be a specific. It was also applied on occasion topically. In 1870,

FIG. 7. Severe burn of the gingivae through the use of sodium perborate in conjunction with other drugs. The many subtle variations in the picture of Vincent's infection (acute, subacute, and chronic; destructive and hypertrophic) sometimes tend to make its diagnosis quite difficult. Not infrequently, it is further complicated by a drastic modification of the original clinical picture caused by the escharotic action of drugs used in its treatment. Of these, sodium perborate is perhaps the most frequent offender either because some individuals are more easily affected by it or because it is used in a too concentrated form. Note the generalized gray necrotic appearance of the swollen gingivae which were also very painful. However, soon after the discontinuance of the irritating mouthwashes, the condition cleared up.

Magitot[41] advocated the use of chromic acid in general and ulcerative stomatitis. He stated that it possessed powerful oxidizing and bleaching properties. Magitot did not say why these qualities should recommend the drug for its use. The relationship between anaerobic bacteria and Vincent's infection had not as yet been discovered. Dentists have continued to use chromic acid for the past 68 years, as an agent for liberating oxygen. But, within recent years, it has been pointed out that the action of this drug on tissues is essentially escharotic and it does not act as an oxidizing agent.[42]

As early as the middle of the Nineteenth Century, the practice of removing the membranous exudate was suggested by Steinberger.[43] *The ulcerated surface was to be cleansed with warm water,* and a caustic *applied especially between the teeth.*

The common practice today of prohibiting the use of tobacco, spices, and irritating foods during the treatment of Vincent's infection was suggested by Falevo[44] 40 years ago. He also syringed the ulcerations thoroughly with a solution of carbolic acid.

A contribution to the method of treatment by G. V. Black,[45] in 1915, was the use of forceful rinsing with salt solution, until every particle of pasty material was removed from the infected gums. It is conceivable that the mechanical action of forcefully flushing the dental arches may be accredited, in no small part, for the effectiveness of the various drugs used by the older practitioners. Gilmer,[20] in 1906, stressed the importance of frequent treatment of the infection. He instructed his patients to flush the mouth every two hours with a warm saturated solution of boric acid, mixed with one drop of oil of cassia.

At the turn of the Twentieth Century,

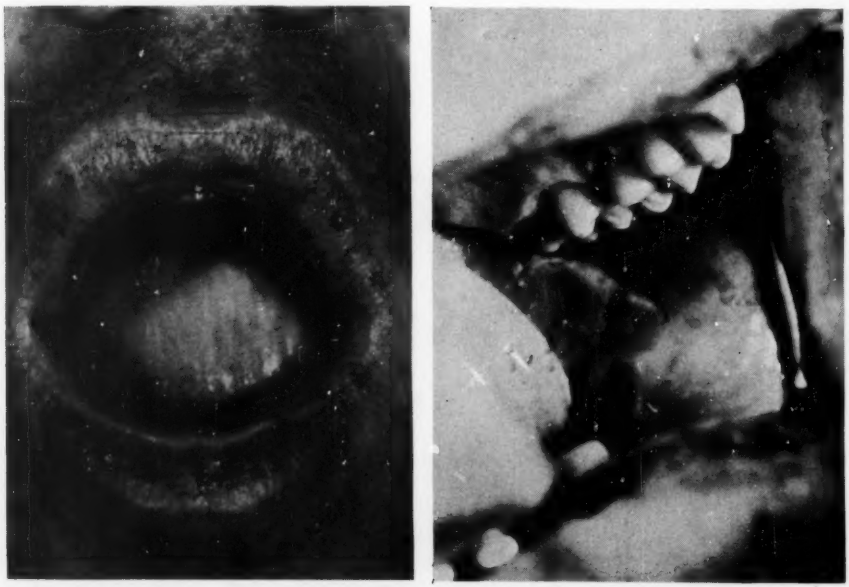

FIG. 8. (Left.) Chemical burn of the lips in a patient who was influenced by an advertisement to use a certain preparation of sodium perborate, for "inflamed and bleeding gums." The lining of the lips and cheeks (see Right) had become a heavy mass of necrotic tissue within a few days. After the perborate was discontinued, the burn healed rapidly. Although the solution used (one tablespoon to a glass of water) is easily tolerated by the average person, clinical experience indicates that approximately 20% of patients cannot use the drug stronger than a teaspoonful in ¾ glass of water, without sustaining a burn of greater or less degree.
(Right.) Same as left, showing large masses of gray, burned lining of the cheek.

FIG. 9. "Hairy Tongue" very frequently produced through the use of sodium perborate. The heavy growth of hypertrophied papillae on the dorsum of the tongue is caused by the irritating chemical action. Although the condition (most frequently noted), as here depicted is comparatively mild and therefore not only tolerated but often unrecognized by the patient, it may, however, when the papillae reach a greater length (sometimes up to about ¾ inch), produce gagging and in more rare instances, a painful swelling of the tongue and submaxillary glands. This recent by-product of anti-Vincent therapy is often, therefore, the cause of considerable concern to the patient and his physician. It has given rise to many a tentative, erroneous diagnosis of ailments ranging from that of a "spoiled stomach" to cancer of the tongue.

methylene blue was added to the ever-increasing number of drugs used in the treatment of Vincent's infection. It was probably the first organic dye to be recommended. In 1910, Ehrlich[46] first used arsphenamine intravenously to treat Vincent's angina. Between 1911 and 1913, the use of a glycerine solution of arsphenamine for local application in Vincent's angina was introduced and became the standard treatment during the World War.[47]

There has been and there still is much controversy regarding the relative value of the use of the arsenicals applied topically or injected intravenously or intramuscularly for the treatment of Vincent's infection. Claims of success with both methods have been cited in the literature. Some even use a combination of local application and intravenous or intramuscular injection. Experimental evidence for the effectiveness of arsenicals as they are applied topically was shown by Rosenthal[48] in an *in vitro* study. He found that arsphenamine inhibited the motility of bacteria faster than neoarsphenamine and that a stronger solution of neoarsphenamine was better than a weaker one. More recently, Rosebury[49] found that local treatment with neoarsphenamine and sulpharsphenamine of experimentally produced fusospirochetal abscesses in guinea pigs was effective, whereas systemic administration of either drug had no appreciable beneficial effect.

In sodium perborate, the arsenicals have a keen rival in both its praise and condemnation. Prior to the beginning of the World War, sodium perborate was used for the first time by Letard.[50] Since then, it is being applied as a paste directly to the lesions and used as a mouth wash in various strength solutions. Hirschfeld,[51] in 1934, pointed out that the use of sodium perborate is not without adverse effects (see Figures 7, 8, 9, 10) on the oral mucosa and warns against its indiscriminate use without professional supervision.

It is noteworthy that so far there is no general agreement upon the drugs indicated in the treatment of Vincent's infection.

FIG. 10. Marked edema of the lips frequently associated with the use of sodium perborate as a mouthwash. This is caused by the evaporation of the aqueous content of the solution. The condition may be prevented by washing the lips off with plain water immediately after the rinsing.

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Rudolf Kronfeld B. S., M. D., D. D. S.,

1901-1940†

The untimely and sad ending of the brilliant career of Rudolf Kronfeld occurred during his term of office as President of the American Academy of Periodontology. It is fitting that we should pause in the proceedings of this annual meeting, at which he would have presided, had he lived, to pay respect to his memory and to dedicate ourselves to the tasks before us with the same kindly patient, intelligent and persistent devotion that characterized his actions in every capacity in which he served. Cheerful and uncomplaining to the end he was, as Dr. Hillenbrand so well stated:

> The victim of a relentless malady that made futile all the powers of the sciences to which he had so fruitfully dedicated his talents . . . The brilliant promise and achievement of his career were stopped in mid-flight, but he would have been the last to decry the value of scientific research which as yet could not make the priceless gift of remedy and cure to him![1]

Rudolf Kronfeld was born in Vienna, Austria, December 10, 1901. His father, who is still living, is a dentist and was active in practice in Vienna for about forty years, before moving to London, England in 1939. His mother died when Rudolf was very young and he and his younger brother, Robert, were guided through their childhood years by their step-mother. The boys and their father were always close confidants. As the boys grew up, the father and sons spent much time in the woods, the mountains, and upon the river and used every opportunity to enjoy the freedom of the great out-of-doors. At ten years of age Rudolf had acquired an extensive knowledge of botany and in later years became an authority in the identification of flowers, plants, and trees about Vienna. He was deeply interested in biology as a boy and frequently kept reptiles and small animals in cages over winter for biologic study. He was always engaged in some outdoor activity and was among the leaders in mountain climbing, water sports and skiing. Dr. Orban, one of his earliest friends and associates, speaks of his interest in sports as follows:

> He was a very fine sportsman and winner of many trophies and prizes. He frequently left Vienna on week-end trips leaving on Saturday afternoon after six o'clock and arrived at the foot of Snow Mountain (Schneeberg) at nine p. m. He then climbed about 6000 feet with his skis on his back reaching the peak about midnight. He spent about five hours in sleep in a cabin and then arose and spent the entire Sunday on his skis returning to the city in the late evening. He was also a member of one of Vienna's regatta clubs and was a fine boatsman. His team won many trophies in competition with other teams. He could take the hardships of sports very well.[2]

Dr. Kronfeld's early education was obtained in the public schools of Vienna, after which he entered the Vienna Gymnasium. The Gymnasium is equal to our four years of high school with two years of college work included. After completing his work in the Gymnasium, he entered the University of Vienna and in 1926 was graduated from their Medical Department receiving the degree of Doctor of Medicine. During his course in medicine, Dr. Kronfeld became interested in research work in the Dental Institute of the University.

TEACHING AND RESEARCH

Dr. Kronfeld became an assistant in the Dental Institute upon graduation and devoted a part of his time to teaching and a part to research. In teaching a group of graduate dental students from Italy he was soon able to converse with them in their own language. He had learned to speak the French language in his home and had ac-

†Memorial tribute by Edgar D. Coolidge at the meeting of the Academy of Periodontology, in Cleveland, Ohio, September 5, 1940.

1 Harold Hillenbrand, Editorial, *The Bulletin of the Chicago Dental Society*, 20(29):13. 1940.

2 B. Orban, Associate, in the Research Laboratory of B. Gottlieb, University of Vienna. Correspondence.

quired a knowledge of English while he was a student in the University.

During the college year of 1926-27, Dr. Kronfeld became attached to the Research laboratory of Dr. Bernhard Gottlieb in the Dental Institute and gave up his teaching and other connections to devote his entire time to the laboratory. He worked with Drs. Gottlieb and Orban until the following summer of 1927, at which time, Dr. Orban left Vienna to take up research in America at the Chicago College of Dental Surgery. From 1926 to 1929 Dr. Kronfeld carried on extensive research under the guidance of Dr. Gottlieb. Ten publications of his studies and research appeared in the German literature during the period he was associated with Dr. Gottlieb.

In May, 1929, Dr. Kronfeld came to Chicago to take up research and teaching at the Chicago College of Dental Surgery, succeeding Dr. Orban as director of the research laboratory. Rapidly adjusting himself to his new surroundings, he soon won the confidence and respect of all who were associated with him. The following statement from his technician and secretary, Maurine Willman Muller, expresses in a few words the high esteem in which his associates held him:

> It would probably be impossible to work with or for a more considerate person than was Dr. Kronfeld. My work as secretary and technician was naturally exacting and complicated but Dr. Kronfeld always made it as easy as possible by his even temper and genuine understanding. He himself knew the essentials of histologic technic, which enabled him to give me sympathetic and helpful advice on many problems, especially in the first couple years of our association. His death is more of a shock to me than I have words to tell. Dental research has surely lost one of its most competent workers.[3]

Soon after his arrival in Chicago, Dr. Kronfeld entered upon the study of dentistry along with his duties at the College and graduated in dentistry with the class of 1933. He entered the College of Liberal Arts of Loyola University and received the degree of Bachelor of Science in 1935. For his outstanding work in the Dental School he was elected to membership in the honor fraternity, Delta Kappa Upsilon and for scholastic excellence in the College of Liberal Arts was made a member of the Blue Key fraternity. He was also a member of the Delta Sigma Delta dental fraternity.

Although he was a stranger in a strange land Dr. Kronfeld made rapid progress in establishing himself in the field of dental research and as a speaker upon programs of dental society meetings. During the first few years his associates frequently introduced him to others but very soon he had more acquaintances and could address more confrères by name than most of those who had introduced him in his early years. His memory of faces and names was most unusual. He seldom had to ask the name of a person twice.

As a teacher, Dr. Kronfeld was highly esteemed by both faculty and students. He was always courteous, considerate, and helpful in every way. He had the unusual ability of making a difficult subject easy to understand and fascinating to study. A student speaks of him as follows:

> He never raised his voice in criticism of another and never refused to answer any question no matter how trivial. If he did not know the answer he always said so and went out of his way to find the answer. He knew his own short-comings and was tolerant of others. His lectures were always orderly and interesting. Simplicity was always the characteristic of his teaching that made it so effective and so popular.[4]

Upon his arrival in Chicago Dr. Kronfeld became attached to the Young Men's Christian Association of Chicago. He was active in the work of that association until his death. Secretary Hiller, of the Y. M. C. A. makes the following comment about Dr. Kronfeld:

> Immediately upon arriving in Chicago to take up his work at the Chicago College of Dental Surgery, Dr. Kronfeld took a room in our residence and became active in our work at once. Nor was his interest abated when he established his own home.
>
> For the past seven years he has been a member of our Board of Directors, faithful in attendance and always active in its deliberations. We never cease to marvel at the apparent ease with which he adjusted himself to our American ways of doing things. His broad educational background and his sympathetic, understanding heart gave us the answer. For his democratic spirit, his friendly attitude, cheerful greetings, and for what he himself was, he was loved by all those who served him and were associated with him.[5]

3 Maurine Willman Muller, Technician and secretary to Dr. Kronfeld. Correspondence.

4 Robert G. Herthneck, Senior Student, Chicago College of Dental Surgery, Dental School of Loyola University, Chicago.

5 J. A. Hiller, Secretary, Y. M. C. A., College Department, Chicago. Correspondence.

Although Dr. Kronfeld was intensely devoted to his duties he had the love of nature so deeply imbedded in his life that he soon began seeking the field, the forest, and the glen at every opportunity. He seldom traveled by the beaten path but sought out the beauty spots on every journey he took. He frequented the sand dunes of Indiana along the southern extremity of Lake Michigan and spent most of his leisure time tramping over hill and dale in search of rare flowers, trees or wild life. Later on he established a home in the dunes which perhaps served as a substitute for his cabin in the Austrian mountains in which he had so often enjoyed the wholesome out-of-door life. Dr. Celia Rich, one of his close friends who had often enjoyed the hospitality of his home writes as follows:

> He never tired of his gardening at his charming home which he and his lovely wife had established on the Indiana Dunes near Lake Michigan and no gift from a friend was more valued than some wild or beautiful plant which he could naturalize there.[6]

PROFESSIONAL ACTIVITIES

Dr. Kronfeld was an active member of many professional organizations to which he generously contributed of his knowledge and time. He regularly attended meetings of medical groups as well as dental. He was a member of the Chicago Medical Society, Illinois Medical Society, American Medical Society, Chicago Pathological Society, American Association for the Advancement of Science, the American Dental Association, the Illinois State Dental Society, the Chicago Dental Society, the International Association for Dental Research, the International Dental Federation, and the Odontographic Society of Chicago. He became a member of the American Academy of Periodontology in 1932, was made a Fellow in the Academy in 1937, elected President-elect in 1938, and became President in 1939. He was granted honorary membership in several dental organizations.

At the time of his death he was President-elect of the International Association for Dental Research and would have been advanced to the presidency at the annual meeting in Philadelphia in March, 1940. He was one of the charter members of the Vienna section of this organization of which Dr. Bernhard Gottlieb was the leading spirit. In 1929 he became a member of the Chicago section, served as Secretary in 1930-31, and as President in 1931-32. Dr. Kronfeld was very active in the International Association for Dental Research contributing much to the organization in its administration as well as to its programs. He usually made some contribution to the quarterly meetings of the Chicago section as well as to the annual meetings of the general session. His contributions were always interesting and helpful. His fellow-workers in other countries appreciated his work as is shown by the following comment from Martin Rushton of England:

> It was with very great regret that dental research workers in England learned of the death of Dr. Kronfeld whose work was held in very high estimation by us all. Though most of us here are debarred from participating in dental research for a while we are able to appreciate what is being done elsewhere and are sad to think that we shall see no more of Dr. Kronfeld's outstanding contributions. I would like you to express to his colleagues the feeling of many of us here.[7]

LITERARY CONTRIBUTIONS

Dental literature has been greatly enriched by the writings of Rudolf Kronfeld. His publications include 19 papers in German literature, one of which was in colaboration with Rudolf Ullik, one published in Paris which was read at the Eighth International Dental Congress, and 43 papers in American dental journals, of which two were in colaboration with Isaac Schour, one with W. H. G. Logan, one with Emil Mueller and one with F. J. Barker, one paper published in England. He left six unpublished papers. In addition to this generous contribution of formal papers he made many addresses before dental societies that were not published. He prepared and displayed about 30 scientific exhibits at dental meetings during the 10½ years that he lived in America.

Two dental text-books have been published, one of which is now in its second edition. This is regarded by his confrères as his outstanding contribution. He contributed one chapter to each of three other

6 Celia Rich, Nashville, Tennessee. Correspondence.

7 Correspondence from Martin Rushton, Rooksdown House, Basingstoke, Hants, England, to Dr. Isaac Schour.

books, one of which is still in the publisher's hands.

His work as an author is highly regarded by his publishers. The following comment expresses their appraisal of his work:

> On behalf of Lea and Febiger, his publishers, I have been asked to express their and my appreciation of Dr. Rudolf Kronfeld as an author. His two standard text-books are among the very best in a carefully selected list of dental texts, and they will remain as monuments to his memory.
>
> In the untimely passing of Dr. Kronfeld my firm has lost a highly-prized author of present proved popularity and of great potential promise, and personally we have lost a highly-esteemed friend.[8]

In an appraisal of the research and published record of the work of Rudolf Kronfeld, Dr. Schour has made the following comment:

> Each investigator selects his problems and research program according to his temperament and standards of usefulness. Kronfeld was motivated by a strong desire to place clinical dentistry on a scientific basis, and was eminently successful in attaining this objective. His research and publications centered on those histologic and histopathologic aspects of problems that confront the dentist in his every-day practice, and were equally valuable in dental education and dental research. His text-book on *Histopathology of the Teeth and their Surrounding Tissues* which passed through two editions will remain a leader in its field for many years. To the dental profession Kronfeld still lives through his published works; and to the many who enjoyed his personal friendship and coöperation, his kind and gentle personality will remain a permanent ennobling influence.[9]

Our highly-esteemed past-president, Arthur H. Merritt, who is fittingly honored at present with the presidency of the American Dental Association, places the work of Kronfeld on a very high plane as follows:

> To but few has it been given to make so great a contribution to the scientific advancement of dentistry as that made by Dr. Kronfeld in his studies on the histopathology of the teeth and their supporting tissues. The work done by him in this field is probably without a parallel in the literature of dentistry. No one can review his many contributions to scientific progress and not be impressed with the laborious and painstaking work that went into their preparation. The dental profession of the world and the American Academy of Periodontology in particular, have suffered an irreparable loss in his premature death. His place, however, is as secure in the annals of dentistry as is that of Black or Miller or Tomes. His influence, like theirs, will last as long as dentistry is practiced.[10]

It had been a cherished desire of Dr. Kronfeld to establish a dental practice. He wished to be able to put some of his vast information into practical use. It had always been his aim and purpose to translate the findings of the research laboratory into actual practice. I shall never forget the thrill of pleasure that he manifested when he and those working under him discovered something in the study of the laboratory material that might shed light on some important subject or perhaps would be of practical benefit to those practicing dentistry.

In 1937 he opened an office for the practice of dentistry during a part of his time. He exhibited a deep interest and enthusiasm in his practice. His associate in the same suite of offices, Dr. Albert A. Dahlberg, has the following comment to make about Dr. Kronfeld in the practice of dentistry:

> I was associated with Dr. Rudolf Kronfeld for over three years in the practice of dentistry, and as this time passed, I became more fully aware of his complete concept of dental and oral problems. On several occasions he told me of the satisfaction he derived from practicing dentistry himself. He had as a result the practitioner's as well as the laboratory worker's point of view. He loved his work.[11]

In the winter of 1938-39, Dr. Kronfeld was overtaken by a fatal illness that began to manifest itself in a progressive manner. He realized that this disturbance would soon make him a helpless invalid. To one who had enjoyed such an athletic youth such a prospect could not be endured. Anticipating his death, he had requested that his body be cremated and he designated one of his favorite spots in the Indiana sand dunes on the southern shore of Lake Michigan where he wished to have his ashes buried. He never complained of his condition nor even spoke of it to his most intimate friends and associates. He carried his burden alone. Only Mrs. Kronfeld and his physicians knew the dark prospect before him. He passed away in his research laboratory on February 13, 1940, surrounded by his library, his histologic material and his work in progress for the coming season.

He is survived by his widow, Margaret

8 W. D. Wilcox, Manager of College Department, Lea and Febiger, Philadelphia. Correspondence.

9 Isaac Schour, Professor of Histology, University of Illinois, College of Dentistry, Chicago. Correspondence.

10 Arthur H. Merritt, President of the American Dental Association, 1939-40. Correspondence.

11 Albert A. Dahlberg, 122 South Michigan, Chicago. Correspondence.

North Kronfeld, his parents, Robert and Valerie Kronfeld, of London, and his brother Robert, internationally known glider and flying instructor of Oxford, England, and a cousin, Dr. Peter Kronfeld, an occulist of great renown of Chicago, Illinois.

Altho in close association with Dr. Kronfeld one could not fully understand nor appreciate in life the unusual character and ability of this man. It could only be revealed in compiling the records of his interests and his achievements together with the statements of his associates and his friends.

He was a man with many interests but was always interested in others and he never seemed too busy to give generously of his time. One of his associates and assistants, Miss Carolyn Hammond, has nicely expressed these characteristics in a statement relative to her association with him:

> During my five years' association with Dr. Kronfeld I came to appreciate that he was a most unique combination of scientist and humanitarian. His scientific ability is internationally known. His wide and varied knowledge, his consideration of others, his keen sense of humor, his enthusiasm, his interest in people as individuals, all contributed to make working with him a very real pleasure.[12]

Not only was Dr. Kronfeld generous with his time but was tolerant and lenient in his estimate of others as is ably expressed by Dr. Rich:

> His loyalty to his friends was only exceeded by his enthusiasm for his work and it was remarkable that with his critical mind in all scientific matters he should have been so charitable in evaluating his friends. We never felt that we were being appraised according to his intellectual standards; instead he accepted us and loved us just as we were. In fact, Rudolf Kronfeld's criticism was never bitter, and it was never personal.
>
> Like all of the truly great he was one of the simplest of men. His pleasures were wholesome. He had a great love for travel and one of the tragedies of his untimely death was that he had looked forward with such eagerness to an airplane trip to California in the spring, on a lecture tour, when he was planning to make many stops enroute for sightseeing.[13]

We leave the narrative here with its forward look to his plans for future work to be done, interwoven with his deep love and enjoyment of nature that characterized his entire life. His face will be greatly missed at our gatherings but his work will be a lasting monument to his memory.

Dr. William G. Skillen has offered the following quotation from one of Emerson's poems as a closing thought for our departed friend:

> The sun set; but set not his hope:
> Stars rose; his faith was earlier up:
> Fixed on the enormous galaxy,
> Deeper and older seemed his eye:
> And matched his sufferance sublime
> The taciturnity of time.
> He spoke, and words more soft than rain
> Brought the Age of Gold again:
> His action won such reverence sweet,
> As hid all measure of the feat.

AUTHOR'S NOTE: The list of published and unpublished works of Rudolf Kronfeld numbering 64 published papers, 6 unpublished papers, 2 text-books, contributions to 3 other text-books and abstracts of 8 papers and reports, has been published in the *J. D. Res.* 19:274-76. June, 1940.

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12 Carolyn Hammond, Member of Staff of the Foundation for Dental Research.

13 Celia Rich, Nashville, Tennessee. Correspondence.

Editorial

Whither Bound?

DURING this Centennial year, dentistry has been proudly boasting of its accomplishments and making a careful survey of its assets in dental schools, dental libraries, dental research laboratories, dental organizations, and current dental literature. Its continually advancing standards of education and technique have also been recorded. In spite of the world shattering events of war and associated disasters, plans for the future of dentistry have been given profound consideration and while the problems of our profession appear insignificant in the light of current events, nevertheless it is a health profession and dentists ought to carry on as courageously now as many of the pioneers have done in times that must have been equally disheartening.

As regards future plans for dentistry, there are two definite and extreme trends but it is questionable whether either one of them ought to be fully supported. By one learned group it is stated that dentists are not sufficiently well educated in the medical sciences, so-called, and for this reason they are unable to fully comprehend dental diseases and their implications, nor are they equipped to satisfactorily teach dental students or to carry on dental research. It is therefore necessary, they say, to extend the dental course an additional year or two, and they hold out the medical degree of Doctor of Medicine as an inducement to dental students. Assurance is given that this procedure will result in better dentists, and in better dental teachers and researchers. Nothing is stated about the additional cost in time and money of educating dentists according to this plan which is already one of the greatest obstacles to securing desirable matriculants for dental schools.

Another equally sincere group discourages any plan which will increase the present costly course of education in dental schools and emphasizes that dentistry is already a luxury for the favored few. It is urged that it should be made available to all even if it be necessary to socialize dentistry to accomplish this end. This group of social optimists fail to take into account the time element and the cost of materials involved in most dental operations, and also the personal equation of the skill required of a dentist and the small number of dentists compared to the great number of citizens who need their services. They urge that dental technique be simplified, that dental pain and infection be relieved, and that emphasis be placed upon dentistry for children and full dentures for adults.

On the one hand, then, we have dogmatic emphasis placed upon scholarship in the medical sciences, with the soft pedal on technical training for the dentist,

while on the other hand an extension of the dentist's ability to serve greater numbers is stressed, at the expense, if necessary, of both scholarship and technical training. It would seem that if either plan were to be generally adopted the public would suffer the inevitable consequence of an inferior quality of any dental service rendered. Dentistry is an exacting profession and a dentist needs to know considerable about many sciences not strictly *medical* in addition to the latter group.

Between these two extreme views there is a conservative plan for the future of dentistry which must be encouraged if its integrity is to be preserved for what it actually is, a health service demanding the finest of technical skill.

No one should question the importance of adequate knowledge of all of the sciences upon which dentistry is based for the graduate dentist. The dental patient, however, is much more interested in the dentist's ability to restore his masticating machine to comfort and function than in his knowledge of related subjects. A good musician must be able to perform successfully for he will usually not be recognized for what he knows about music but for how well he can sing or how well he plays his musical instrument. Great orchestral conductors are often exceptions to this rule, but most of them were first great pianists, or cellists, or perhaps violinists before they became conductors.

No one discredits a musician or an artist because he uses his hands to express his art. Where then can there be a valid excuse for the supercilious attitude of many physicians and some scientifically minded dentists toward that phase of dentistry which demands the utmost in technical skill. In order to deliver dentistry to a patient, which is after all one of the chief functions of a dentist, the operator cannot be limited to diagnosis and preventive methods, but he must be able to skillfully perform on vital tissue preserving its function and its relation to associated structures. The most clever dental operator wishes that he were more so.

While researchers are seeking the ultimate cause of dental and periodontal diseases, the dental clinician must continue to apply broadly the knowledge already at hand, thereby lessening the destructive influences acting upon the teeth and conserving the masticating machine in a state of health. It will be a sad day when, and if, dentists are trained to be critics, diagnosticians, and scientists only, with indifferent technique and a disinterested approach to performing operations upon the teeth.

Let us keep to the middle road between the two extreme trends and accept graciously any deserved criticism from both sides. We ought to take promptly any steps essential to the correction of our defects, but at the same time fight, if necessary, for the development of dentistry in the direction of its greatest usefullness.

—*G. R. S.*

ABSTRACTS AND EXTRACTS OF CURRENT DENTAL LITERATURE FOR 1939

Periodontal Histo-pathology, Periodontal Bacteriology, Other Researches, Clinical Etiology.

(a) Periodontal Histo-pathology

(Continued from 10(2):94. July, 1939)

196—Bodecker, C. F.: **Relation of histology and histo-pathology to clinical dentistry.** *J. D. Educ.* **4**:50-59. Oct., 1939.

This is the third article in the series on "The relations of licensure and dental education," dealing with questions of interest to educators and examiners.

The following questions are discussed in this paper:

1. Classify the oral mucosa according to the degree of resistance its various areas offer to the force of mastication and to injury from careless tooth brushing.
2. Describe the layers which compose the gum tissue and name the one to which it owes its high resistance to trauma.
3. Describe the process of desquamation, active in the oral cavity as well as on the surface of the body.
4. Describe the histological changes which follow the proper daily brushing of the gingivae.
5. From which layer does hemorrhage of the gum originate?
6. What mode of home treatment would you prescribe for hemorrhagic gingivae?
7. Correlate the microscopic structure of healthy and inflamed gingivae with their varying clinical appearances.
8. Describe the two types of tissues of the oral cavity which prevent the penetration of infection.

—*H. L.*

197—Laboratory research note: **Chronic parodontal inflammation and absorption of the dentine.** *Brit. D. J.* **66**:90. Jan. 16, 1939.

Report has to do with the absorption of dentine caused by chronic irritation resulting in what the writer calls a "pink spot." An interesting photomicrograph of a human tooth thus affected is shown. It is usually the result of chronic irritation, generally due to an exposure of the pulp with a localized chronic abscess at the site of exposure.

A commoner occurrence is for osteoclasts to eat through the cementum and dentine into the pulp from the periodontal membrane in cases of chronic toxic absorption from the parodontal pocket. If this occurs the pulp also becomes chronically inflamed and the absorption of dentine takes place on all sides. Some attempt is generally being made to fill up the absorbed areas in these cases with calcified tissue of repair resembling lacunar cementum.

It appears to be a question of the severity of the stimulus afforded by the irritation whether the mesenchyme cells will respond by absorbing the existing matrix or by depositing more matrix on it. In this case the pulp is not involved.

—*J. S.*

198—Rosenfeld: **Histologische Untersuchungen ueber das Verhalten des Vitamin C in den verschiedenen Organen waehrend der Wundheilung.** Histologic studies on the vitamin C content of various organs during the healing of wounds. *Z. Rund.* **47**: 1939.

In studies on guinea pigs, on which wounds had been made, it was found that vitamin C is of considerable importance for the healing of wounds. In contrast to animals on a diet poor in vitamin C, guinea pigs flourished on a daily dose of 100 mg. of Redoxon. A good quantity of ascorbic acid was demonstrable in the granulation tissue (according to the method of Girond and Leblond), as well as in the adjoining

skin. This study is important, from a clinical standpoint, in so far as the conclusion can be drawn that the most severe disturbance of regeneration arise in vitamin C deficiency. We must look in this field with renewed vigor for the cause of poor wound healing, and proceed accordingly in therapy.

—*M. B.*

199—Stewart, D., and Lewinsky, W.: **Comparative study of innervation of the gum.** *J. A. D. A.* **26**:1924. Nov., 1939.

A comparative study was made of the connective tissue of the gum underlying the epithelium with material taken from carnivores, rodents, insectivores and men. The fibers form superficial and deep plexuses, and leashes and specialized nerve-endings are also present. The types of specialized nerve endings seen have been: (1) coils which are situated in the intrapapillary zone or the deeper connective tissue, and (2) Ruffini-like nerve endings and convoluted fibers, the presence of which in the gum has not been previously described.—*Proc. Roy. Soc. Med.*, 32:1054. July, 1939.

B. P. KEARNEY.

—*Copy.*

200—Thoma, Kurt H., and Goldman, H. M.: **Pathology of dental cementum,** *J. A. D. A.* **26**(12):1943-53. Dec., 1939.

Secondary cementum may be formed by four different processes: (1) general hypercementosis due to elevation of the tooth; (2) hypercementosis due to inflammatory reaction; (3) spike formation; (4) root repair.

General hypercementosis is due to the increased rate of eruption of teeth and nature's attempt to maintain the normal length of the root and the normal width of the peridental membrane. It is not dependent on function.

In apical infections, secondary cementum forms partly as a result of cell irritation from the inflammatory conditions. However, if the crown is destroyed, or if the tooth has no antagonist, the tendency of the inflammation to cause the tooth to erupt faster is an important factor in the formation of localized deposits on the side of the root. Spike formation may occur in occlusal trauma. In resorption on the surface of the roots, injury such as a cemental tear and root fracture, repair is made by means of secondary cementum.

Neoplastic formations can be divided into (a) cementicles and (b) cementomas. Cementicles are formed in the peridental membrane and may become attached to the cementum of the tooth. Cementomas, which generally form in the subapical area, vary in histologic make-up according to the degree of specialization of the tumor cells. Thus, it may be composed of homogeneous or laminated cementicles or trabeculae of osteocementum resembling bone.

—*H. M. G.*

201—Thoma, Kurt H., and Goldman, H. M.: **Correlation of clinical and pathologic phases of parodontal diseases.** *D. Items Interest*, Part I. **61**(1): 103-115, Feb., 1939. Part II. **61**(2): 212-224, Mar., 1939. Part III. **61**(3):309-314, Apr., 1939. Part IV. **61**(4):453-464, May, 1939.

A series of four articles based on the clinical, radiographic, and histopathological study of jaws obtained at autopsy; together with correlation of the different findings.

Through investigation of clinical cases, which the pathologic work substantiates, authors have been able to classify this group of diseases into eight main types: (1) gingival recession due to abrasion (faulty tooth brushing); (2) senile atrophy, (presenile atrophy); (3) atrophy from disuse; (4) atrophy from excessive occlusal trauma; (5) gingivitis; (6) marginal parodontitis; (7) parodontosis; (8) syndrome (three combinations of parodontosis and marginal parodontitis).

They have presented:

Clinical pictures of each type with illustrations depicting histopathology, so that the reader will be able to correlate the clinical picture to the microscopic findings. This will enable him to classify these diseases and treat them with an understanding of their pathology.

This extremely interesting study is presented entirely by means of illustrations with detailed explanatory notes.

—*C. R.*

202—Tonutti, E.: **Histochemische Vitamin C - Untersuchungen.** Histo - chemical studies on vitamin C. *Schw. Monat. für Zahn.* **6**:640. 1939.

The vitamin C studies, in which dentists are much interested, include the discoveries of Tonutti and his workers. Their researches give us new insight into the, as yet, ambiguous role of vitamin C in cell metabolism. According to Tonutti, the vitamin C content of a cell can consist of a true storage or merely a loading-up. This changing of vitamin C is used for momentary work done by the cell and is variable. There is always a greater vitamin C content of the cell preceding a phase of increased activity

of the cell. Parallel with this cell activity occurs the need for oxygen, so that the intercalation of vitamin C in oxygen transmission is easy to understand. True vitamin C storage is found only in the mesenchyme of endocrine glands, where it is stored for quick service. The inclusion of vitamin C within the cell plasma occurs through the Golgi body, which regulates the vitamin content independently of the external supply.

—*M. B.*

203—Tonutti, E.: **Uber die Bindung der Vitamin C an eine Trager-substanz in der Zelle.** Combination of vitamin C with a carrier substance in the cell. *Schw. Monat. für Zahn.* **6**:642. 1939.

By means of the combination of vital trypan blue and simultaneous silver nitrate treatment, both reagents stain the same carrier substance, depending on which enters the cell first, which can be histo-chemically demonstrated.

According to the opinion of the author, materials are disposed of in the plasma in the manner of a dose by the Golgi body, where all things, in an active cell, are used for granule formation, showing an active cell metabolism. In a dying cell, where the whole cell contents are stained diffusely (including the nucleus), the cell has lost the ability to condense materials into its organic structure. Granule formation is thus intimately bound up with energy consumption.

Through large parenteral doses of vitamins, the author imposed a high vitamin C excretory activity on the oxygen-sensitive kidney cells, and let the animals die; then, he made histological sections. These showed an inverse distribution of vitamin C granules. The kidney cells showed storage of vitamin C, in contrast to the normal picture. The cells in the connective tissue showed abundant but not granule-bound vitamin C.

—*M. B.*

(b) Periodontal Bacteriology

(Continued from 10(2):94. July, 1939)

86—Bibby, Basil G.: **Oral bacteriology: Basic considerations bearing on disease and therapy,** *J. A. D. A.*, **26**(4): 629-36. Apr., 1939.

Difficulties in the study of oral bacteriology explain in part its inadequacy. No culture media gives a complete picture of the oral flora, and both direct smears and hemocytometer counts are open to criticism because they include dead and living organisms and those from saliva and debris.

Many phenomena influence the growth of bacteria in the mouth. Inhibition by saliva, bacterial antagonism and the constant washing action of the saliva simplify and reduce the permanent flora somewhat. But great variations have been shown to exist between the bacteria from different areas in the same mouth, between different mouths, from day to day, and more permanently during the establishment of the flora of infants mouths.

In differential percentage counts from smears of the bacteria in the mouth supplemented with the meagre cultural methods available, it has been established that cocci are by far the most prevalent types; gram positive and negative cocci are found in different ratios. In descending order of occurrence come bacilli, fusiforms, leptotrichia, actinomyces, vibrios and spirochaetes.

Although none of the following theories of oral diseases has been definitely established, it is thought that (1) calculus and plaques may be caused by the stroma of actinomyces and leptotrichia, the former resulting from retaining precipitated calcium salts; (2) Vincent's disease may be caused by treponemata and fusiforms; (3) gingivitis may be the result of the action of cocci and vibrios; (4) Pyorrhea always shows an increased growth of bacteria; (5) there may be some connection between certain oral bacteria and focal infection; (6) the whole problem of dental caries is still unsolved, but the prevalent theories claim that lactobacilli or streptococci, or both, are the aggressive agents.

—*Author's Abstract.*

87—Bibby, B. G. and Berry, G. P.: **Bacteria obtained from mouth,** *J. of Bact.* **38**:249-354. Sept., 1939. Abstr. in *J. A. M. A.* **113**(21):1914. Nov. 18, 1939.

By the use of anaerobic methods and of a wide variety of culture mediums, Bibby and Berry isolated from the mouth many strains of filamentous bacteria. On the basis of the morphology and the characteristics of growth of the eighty-three strains which

were successfully carried in subculture, a tentative working division into seven groups is proposed. Six of these have distinct characteristics. Only two, however, can be identified with organisms which have been isolated by previous investigators, although organisms showing some resemblance to a third group have been described. Four of the groups of filaments have the characteristics of the genus Leptotrichia, one of the genus Fusiformis and one of both genera. Of all the groups, only one embraced strains all of which were alike in biologic properties. For these organisms the authors suggest the name Leptotrichia buccalis because they represent the most commonly isolated of the culturable oral filaments.

—*Copy.*

88—Hill, T. J.: **The influence of saliva upon the growth of oral bacteria.** *J. D. Res.* **18**:214-24. June, 1939.

The belief that saliva contains healing qualities has long been a clinical observation. Analysis would show this inference could be due to the following factors:

1. The amount of saliva secreted and mechanical influence involved.
2. The presence in the saliva of lysozymes and their demonstrated bacteriolytic power against Elberthella typhosus, M. lysodeikticus and other organisms.
3. The bacterial antagonism of mouth flora against some organisms.
4. The presence in the saliva of other substances which have antibacterial properties. Since the work of Sanarelli (1892) such inhibiting substances have been repeatedly demonstrated. The presence in the saliva of liberated antitoxin, substances which inhibit the growth of bacteria (inhibins), substances which attenuate organisms (mutins) and agglutinins are well known.

That some of these or other influences are effective against L. acidophilus and play an important part in the susceptibility of individuals to caries has been demonstrated.

—*Author's Abstract.*

89—Hine, Maynard K. and Bibby, Basil G.: **Variations in the oral flora from time to time.** *J. D. Res.* **18**:61-66. Feb., 1939.

Smears taken at regular intervals from certain areas in the mouths of two individuals showed considerable daily and individual variation.

Certain groups of organisms, however, maintained an average percentage which corresponded to the figures established previously for that specific area. For example, 50% of the organisms found on the posterior surface of lower molars consisted of gram positive cocci, with percentages of gram negative cocci being uniformly less.

These variations from day to day explain some of the puzzling results obtained when studies of the oral flora of different areas of the mouth are made, and also point out some of the difficulties encountered in a study of the bacteriology of the mouth.

—*Author's Abstract.*

90—Moffitt, John J.: **Preservation of the teeth by control of oral bacteria.** *J. A. D. A.* **26**(11): 1812-18. Nov., 1939.

"It is essential for dentists to familiarize themselves with oral bacteria and laboratory technic, because every one of the lesions—recession of the gums, dentinal caries, alveolar abscess, pyorrhea alveolaris—that cause loss of teeth began with an invisible growth that could readily have been discovered with a microscope. If these invasions can be kept in mind, visualized by the operator and checked before the colonies of organisms become large enough to be seen or felt; if they are kept in subjection by dental care every month, and cavities and root canals in teeth already infected are treated with due observance of bacteriologic requirements, the conditions so deplorable in later life will seldom develop in our patients."

A hitherto unknown organism was found in the dental tubuli beyond the extent of cavity preparation, "a minute gram-negative diplococcus Neisserium caries dentium." The employment of autogenous vaccines in

oral infection, caries, alveolar abscess and systemic conditions accompanying the oral disease

has been met with amazing success at the Harrisburg Hospital.

—*C. R.*

91—Tunnicliff, Ruth: **The organisms in Vincent's infection.** *J. A. D. A.* **26** (12):1987-1991, Dec., 1939.

The term "Vincent's infection" is defined. The morphologic, cultural, and staining characteristics of the fusiform bacillus and spiral organism are described. Evidence for an etiologic relationship between the fusiform bacillus and spiral organism and

the necrotic process is discussed. The microscopic pictures of lesions found in Vincent's infection and pyorrhea are compared. Evidence for and against the theory that the fusiform bacillus and spirillum are different forms of the same organism is presented. The conclusion is that

fusiform bacilli develop not into true spirochetes, but into loosely coiled spiral forms resembling spirochetes.

The spiral forms found in pure cultures of fusiform bacilli are dissociants and when isolated produce a typical rough colony while the bacillus gives rise to a smooth colony. The role of resistance in the host is discussed. Finally, hasty diagnosis of Vincent's infection from stained smears is warned against.

In making a diagnosis, one must keep in mind the typical picture seen in the unmixed infection and must be guided by the clinical findings.

—*Abstract from*
Dr. Tunnicliff's Laboratory
Carolyn Hammond.

(c) Other Researches

(Continued from 10(2):101. July, 1939)

106—Bober, Dr. H.: **Paradentalbefunde bei Schuldkindern.** Findings on paradental conditions of school children. *D. Z. W.* Jan. 6, Jan. 13, 1939.

A study was made of 2497 school children on the condition of the paradentium and related conditions, individually with 926, and collectively with 1571; groupings were made on the basis of age: children (6-10 yrs.) and those at the age of puberty (13-16 yrs.).

Results of the individual studies were: with children at the age of puberty, some 50% had pathologic changes in the paradentium; while with the younger group, some 10% showed the same condition.

As an aid in examination of the condition of the paradentium, dry and moist blowers were used. The frequency (83.5%) of pigmented margin on the tooth near the gum, together with ricketic changes in the skeleton of the head and face, suggests a causative relationship . . .

The intensity and frequency of occurrence of disturbances in the paradentium force one to demand that the most thorough attention be given to this relationship in the regulation of the health of school children and youth. The fact that a great number of paradental conditions are the sign of constitutional disturbances makes the dental organ and its changes a diagnostic aid of considerable importance.

—*M. B.*

107—Cecil, R. L., and Angevine, D. M.: **Clinical and experimental observations on focal infection, with an analysis of two hundred cases of rheumatoid arthritis.** *Abstr. J. A. D. A.* **26**:2090. Dec., 1939.

In this paper, the term "rheumatoid arthritis" is used to describe the picture of a chronic progressive inflammatory disease of several joints, which is characterized in the early stages by periarticular swelling and fusiform fingers, and in the later stages by ankylosis and deformity.

The authors review a series of 200 clinical cases of "chronic infectious arthritis," which Cecil and Archer reported in 1927, with special reference to the incidence of focal infection. In this report, focal infections appear to have been very common, and the removal of foci, especially when carried out early in the disease, seemed to produce beneficial results in a good proportion of cases. Today, the authors would probably omit many of the cases as not fulfilling the criteria of rheumatoid arthritis, and, in view of present knowledge, it is possible that a good many patients would have shown improvement even if the foci had not been removed.

In contrast with this series they present an analysis of a group of 200 cases of typical rheumatoid arthritis taken from records in the private practice of Cecil. No case has been included that did not fulfill the classical pattern of the disease. For example, every case in the series showed, or had shown at some time previously, several characteristic fusiform fingers which, in the authors' opinion, are a typical manifestation of this syndrome. The sedimentation rate was accelerated in 93 per cent of the patients, and the agglutination reaction with a strain of hemolytic streptococcus was strongly positive in 65 per cent. There was definite evidence of infection in 20 per cent and a questionable focus in 10 per cent. Seventy per cent of the patients revealed no demonstrable focus of infection.

Experimental work was performed on

rabbits in an attempt to produce foci of infection and arthritis. From these studies, the following information was obtained:

1. Arthritis was produced in only eleven of 100 rabbits which were given injections by other than the intravenous route. To accomplish this it was necessary to use large doses of a suitable strain of streptococcus, as well as a most susceptible animal.

2. Arthritis developed only in those animals in which streptococci were recovered from the blood stream shortly after the injection.

3. In rabbits the gums were a particularly favorable site for the absorption of bacteria.

4. Repeated injections of bacteria caused no more arthritis than a single injection.

5. It was difficult to establish a chronic, persistent focus of infection in rabbits.

The authors stress the point that, in the final analysis, the decision regarding the eradication of so-called foci of infection should be made by the internist rather than by the specialist, and that physicians should exercise a more conservative attitude than they have in the past regarding the treatment of tonsils, teeth, and sinuses in rheumatoid arthritis.

A complete revaluation of the focal infection theory is necessary. Undoubtedly, there are cases of infectious arthritis which result from focal infection. However, as far as typical rheumatoid arthritis is concerned, it would appear from this study that chronic focal infection plays a comparatively unimportant rôle.—*Ann Int. Med.*, 12:577, November, 1938; abstr. *Surg. Gynec. & Obst.*, 69:104, July, 1939.

108—Kammerer: **Kapillarmikroskopische Untersuchungen von Paradentosekranken als Grundlage von Ernahrungsforschungen.** Capillary-microscopic studies on paradentotics as a basis of nutrition investigation. *Hippokrates.* **38.** 1939.

In these experiments, interest centered especially on the question of how far improvement of organic function can be obtained through a change in nutritional conditions and how far such an improvement can be demonstrated. It was Bommer especially who showed that the nutrition might decidedly influence the behavior of the blood vessels.

After a description of the technic used in this study, it is stated that capillary-microscopic findings in the gingiva must be a disappointment to those who would like to find more than a general diagnostic means. The studies of the author cover the results of other investigators who were able to establish that in paradentotics, there are no uniform capillary conditions to be found; better results are found in caries. Nothing can be said concerning the relationship of paradentosis capillary structure and vitamin C deficiency. Dr. Kammerer joins with other authors who maintain that there is nothing gained in administering an artificial vitamin preparation; in specific conditions of vitamin deficiency, all vitamins must be given. Administration of an artificial vitamin preparation leads to vitamin unbalance. The whole mode of living of a patient must be changed; a regulatory therapy must be enforced. The research of Euler, which was presented at the Dental Congress in Berlin in 1918, is mentioned as emphasizing the importance of scientific dentistry to the science of nutrition.

—*M. B.*

109—Kashara, M., Nishizawa, J., and Hirao, S.: **Über die Wechselbeziehungen. zwischen B_1 und C Vitamin.** Metabolic relationship between vitamins B_1 and C. *Klin. Wschr.* **7**:246. 1939.

Animal experiments show that the antineuritic action of vitamin B_1 is increased by the simultaneous administration of vitamin C, and vitamin B_1 exercises a supporting action on the scorbitic guinea pigs. The following changes were observed in the incisors:

In guinea pigs, which were kept on a scorbutigenic diet for three weeks, the odontoblasts were small and apparently greatly disorganized; the inner layer of dentine was small and projected into the pulp without any order; the vessels of the pulp were greatly dilated.

In guinea pigs fed scorbutigenic food plus vitamin B_1, the odontoblasts were long and lay almost parallel, only partly disorganized; the inner dentine layer was somewhat smaller; the pulpal vessels were only moderately dilated.

From these studies it can readily be concluded that vitamins B_1 and C have synergistic action.

—*M. B.*

110—Kroker, F.: **Ist in Konserven noch Vitamin C enthalten?** Does preserved food contain vitamin C? *Med. Welt.* **4**:123. 1939.

As the result of over 120 studies, the following general conclusions can be drawn, which hold both for ordinary cooking and preserving: vitamin C is easily osicized; it is water soluble and is easily taken up into cooking water, so the utilization of this water as part of the food is very essential; vitamin C is relatively stable in the presence of acid, and is held better in such fruits and vegetables, (tomatoes, citrus fruits).

Regarding preserving methods, it can be stated generally, that at least one quarter to one third of the vitamin C content remains, the household methods of preserving show no better results; vegetables which are colored green with copper are practically free of vitamin C; on the other hand, a great number retain as much as 60% to 80% of their vitamin C. In conclusion, it can be said that the vitamin C content of preserved foods varies; in this, the method, the vitamin C content of the fresh vegetables and fruits and the manner of pre-cooking play a part; careful pre-cooking and not too effective sterilization are necessary to preserve the vitamin C content.

—*M. B.*

111—Kruttke: **Untersuchungen über das Vitamin C Defizit bei Stomatitis, Gingivitis und Paradentose in der Kriegsmarine.** Studies on the vitamin C deficit in stomatitis, gingivitis, and paradentosis in the navy. *Dtschn. Militararzt.* **7**. 1939.

Studies were made on 200 cases, in which evidence was collected according to the method of Tillman. In all except 27 cases, successful cure was obtained without the administration of pure vitamin C. In 11 of these 27 cases, no improvement was obtained in spite of correcting the vitamin C deficiency. Six cases were cured after supplementary local therapy, and five after administration of Citrone. The author believes that stomatitis, gingivitis, and paradentosis are not to be considered as hypovitaminosis conditions, but rather that the idea of correlation and relationship of the vitamin C complex are decisive factors. It is further asserted that there are no connections between severe paradentosis and a high vitamin C deficit.

—*M. B.*

112—Kutzleb, H. J.: **Veranderungen der Mundschleimhaut bei ovarillen Störungen.** Changes in the oral mucosa in ovarian disturbances. *D. Z. W.* **42**:906. 1939.

Gingivitis of puberty in girls can be compared to gingivitis of pregnancy; both of these are of hemorrhagic type. Taking Wetzel's classification of pregnancy gingivitis to apply equally to puberty gingivitis, we have three types: 1. Puberty gingivitis simplex; 2. Puberty gingivitis diffusa; 3. Puberty gingivitis hypertrophicans.

Both gingivitis conditions are connected with changes in the female sex organs; but since gingivitis does not occur in all girls and women, there must be other factors at work. From a study of 300 girls, between the ages of 11 and 16 years, who presented gingivitis at the onset of menstruation, Kutzleb arrives at the conclusion that not all hemorrhagic hypertrophic gingivitides in pre-puberty can be considered puberty gingivitis; differential diagnosis must be made for avitaminosis and resistance of the gingivae. As an etiologic factor of puberty gingivitis, there is the follicular hormone which occurs in abnormally large amounts. This condition is not improved by vitamin C.

The author then discusses the so-called pregnancy gingivitis and in his cases he has found this type of gingivitis not only in pregnant women but also in women with ovarian disturbances. This type of gingivitis can be treated successfully with vitamin C. Pregnancy gingivitis is not really a vitamin deficiency condition; it is cured by vitamin C because of a relationship between this vitamin and the corpus luteum which is not yet clear.

—*M. B.*

113—Laskowski, B. Stephen: **Oral health as related to cusp form of prosthetic posterior teeth.** *Abstr. J. D. Res.* **18**:249. June, 1939.

This preliminary study is based on the assumption that all prosthetic posterior teeth are used empirically, not having been clinically tested to prove their value in prosthetic oral health service. Eighty edentulous patients were treated: 40 with anatomic posterior teeth; and 40 with non-anatomic posterior teeth. Data were recorded relating to the examination of patients prior to constructing the dentures, to the making and

inserting of the dentures, and to the examinations and treatments during the patients' adjustment periods. In studying these data it was found that the patients treated with non-anatomic posterior teeth had shorter adjustment periods, fewer denture adjustments, and less affected tissue area.

—*Copy.*

114—Mayer, E.: **Zum Vitamin C Gebrauch im Saugling und Kindesalter.** Use of vitamin C in nursing age and early childhood. *Archiv. f. Kinderheilk.* 1. 1939.

Studies were made on the loading capacity with Redoxon in eleven nursing infants and eleven young children. Simultaneous experiments with the titration method of Tillman and the reagent paper method of Scheer gave essentially the same results. In all nursing babies and young children, there exists a greater or lesser degree of lack of saturation with vitamin C. Vitamin C usage by the nursing infant is relatively high in relation to the adult, and higher than in early childhood. The vitamin C need of the breast baby is less than that of the bottle baby. Nursing infants have no power to store up the vitamin. In early childhood, this power exists to a slight degree; in all children there is more or less marked vitamin C deficiency. The causes of this are artificial feeding, food poor in vitamin C, and infections. To correct this C-hypovitaminosis, daily diet must contain enough of the vitamin, either natural or synthetic.

—*M. B.*

115—Mellanby, May: **Dental research with special reference to parodontal disease produced experimentally in animals.** *D. Rec.* **59**(5):228. May, 1939.

Experimental observations on the association of diet, especially of vitamins A and D, and the structure of the periodontal tissues are recorded. From these experiments it is inferred that the inclusion in the diet of a liberal supply of vitamins A and D during the first few months after weaning, the period of development, is of greater significance than their inclusion only during the months after the development of the tissues is complete or nearly so.

Summary of the effect on parodontal disease of varying the amounts of vitamins A and D in the diet is given as follows:

Diet during period of development	*Later Diet*	*Resulting Conditions of Mouth*
(1) Much A and D.	(1) Much A and D.	(1) Little or no disease.
(2) Little A and D.	(2) Little A and D.	(2) Much disease.
(3) Much A and D.	(3) Little A and D.	(3) Little disease.
(4) Little A and D.	(4) Much A and D.	(4) Disease but less severe than (2).

Of interest also are the experiments made to see whether under varying dietetic conditions there was any difference in the healing of gum injuries caused either surgically or by caustics. Regarding this the authoress states:

Much more experimental work must be done, before any definite conclusions can be drawn, but it can be stated in general terms that whatever the condition of the epithelium at the time of the operation, a high vitamin A diet given for a few weeks prior to the operation, and during the process of healing tends to result in well formed regenerated tissue, whereas a diet deficient in the vitamin tends to result in abnormal, hyperplastic tissues.

116—Miller, Samuel Charles, and Pelzer, Rudolph H.: **An original classification of alveolar types in periodontal disease and its prognostic value: corroboration by plasma phosphatase determinations,** in: *J. A. D. A.* **26**: 565-74. Apr., 1939.

An original classification of alveolar bone types as distinguished radiographically is given with corroborative evidence by phosphatase determinations in the circulating blood and in the periodontal tissues. By this classification it is possible to distinguish radiographically the activity of alveolar dissolution and to determine the rapidity of its progress.

The rule to be applied can be stated in the following words: *Rapidity of bone destruction is in inverse proportion to the uniformity of density of the alveolar support.* Thus we find that the following radiographic entities may be realized:

1. Normal alveolar support: The alveolar process is of even density throughout. There is an even distribution of light and dark areas. The crest of the alveolar wall is protected by the lamina dura or peridental lamella which surrounds it and dips down to line the alveolus, leaving a thin dark line or space occupied by the peridental membrane. Radiographically, there is no suspicion or prediction of disease.

2. Marginal thickening of the peridental membrane line with thinning of the peridental lamella or lamina dura: This indicates the beginning of periodontal disease and will enable the dentist to predict by five years the actual clinical appearance of the disease. It is the radiographic equivalent of rarefying pericementitis fibrosa as described histologically by Box.

3. Arrested bone destruction: The bone crest is at a lower level than normal, but the alveolar bone is of even texture throughout, with the same density up to the margin of the bone. The height is dependent on the amount of destruction which has previously occurred. If destruction is arrested for some time, there is a new dense white line over the remaining crest of the alveolar process which continues to form the peridental lamella or lamina dura.

4. Slow bone destruction: The level of the bone crest may vary and is not an important consideration in determining the rapidity of bone dissolution. When the peridental lamella is absent over the alveolar crest and there is darkening of the alveolar process penetrating only a short distance into the bone septum, it may be considered that a slow destructive process is under way. Beyond the shallow area of penetration, the remaining alveolar process is of uniform density.

5. Rapid bone destruction: In this situation, the peridental lamella or lamina dura is already destroyed and there is a gradual darkening of the alveolar bone, increasing toward its present crest, the bone gradually fading into the darkness of the soft tissue covering it. The greater the depth of penetration of this shading into the alveolar process and the more gradual the diffusion from the darkened structure to the lighter structure of normal bone, the more rapid the decalcifying process.

The radiographic findings are corroborated by laboratory investigation which indicates lowest mean difference in local phosphatase levels in arrested and normal cases, higher phosphatase levels locally in slowly active alveolar crest disintegration, and highest local phosphatase levels associated with rapid bone dissolution.

—*Author's Abstract*

117—Neuweiler, W.: **Vitamin C Probleme.** Vitamin C problem. *Zeit. Vitaminforschung.* **3**:251. 1939.

Rygh has tried to show that narcotin, namely the methylated product methylnornarcotin, played a specially important role in the prevention of scurvy. He had previously called methylnornarcotin itself vitamin C, but was later shown to be incorrect. He is now of the opinion that ascorbic acid is not the precise vitamin C, but that narcotin in combination with ascorbic acid make up vitamin C. He says that when scorbutogenic diet is freed from narcotin through extraction with ether, ascorbic acid alone is not enough to prevent scurvy. Only through the administration of methylnornarcotin or narcotin can scurvy be prevented. Rygh further states that the antagonistic action of vitamin D on vitamin C is of the utmost importance in the genesis of scurvy; and that, further, the rachitogenic and antirachitogenic substances in oats, which are always given in a scorbutic diet, are not to be neglected, since these substances have a great effect on the influence that vitamin D exerts in the origin of scurvy.

Dr. Neuweiler, in his own experiments, attempted to reproduce Rygh's results, using five groups of guinea pigs, each group on a different type of diet. His results are different from those of Rygh; both the ether-extracted and untreated diets had the same scorbutogenic effect, and ascorbic acid, in equal amounts in both cases, prevented scurvy. From his results, Dr. Neuweiler cannot agree on the influence of narcotin on the genesis of scurvy, as claimed by Rygh.

—*M. B.*

118—Neuwirt, F.: (Czechoslovakia). **Significance of research on paradentosis.** Abstr. *J. D. Res.* **18**:276. June, 1939.

Since the human teeth have degenerated by our mode of living and inadequate nutrition and for generations have not performed their original functions they cannot be used as the base line in study of the physiological processes of elimination of teeth. Local factors operate only on those teeth with reduced resistance. While external agents are important, anomalies in biologic processes and functions of paradentium are more important in the pathogenesis of the disease. Physiological self cleansing, physiological attrition, rational nutrition, sunshine and healthful living will protect man from paradentosis better than any medical treatment. By rational therapeutic measures

many congenital or acquired anomalies of position can be repaired and mechanical disturbance of the paradentium prevented. Mechanical influence is important but teeth reacting to strain by denudation of root have been fundamentally weak. Paradentosis of uncleanliness results from interaction of exogenous and endogenous factors, the predominance of one or the other determining the clinical form of the disease. A number of general systemic diseases have been found responsible for loss of resistance in the paradentium (hypovitaminoses, endocrinopathies, diabetes, etc.) although a constant casual relationship is not evident. Future generations will be able to develop a paradentium of higher biologic resistance and by a slow evolutionary development give sounder teeth to mankind. (Published in *Arch. Czechoslovak. Stomat.* 38. 1938.)

—*Copy.*

119—Schroeder, H.: **Grundsätzliches zur Frage unseres Vitamin Bedarfes.** Basic to the question of our vitamin requirement. *Munch. med. Wschr.* **4**:133. 1939.

According to the research of Moll and Giroud, with guinea pigs, there is a great span between the quantity of vitamin C, which prevents the development of clinically apparent scurvy, and that in which, histologically, all symptoms of scurvy are missing—it is 0.25 to 5 or 8 mg. Applied to the human, it means that not so much vitamin C is needed to prevent the clinical manifestation of scurvy, but that an optimal dosage which, according to prevailing research, amounts to between 50 and 60 mg. daily is sufficient.

Scurvy is the most common symptom of a vitamin C deficiency, and between avitaminoses and full health lies a wide gulf not well understood.

—*M. B.*

120—Sognnaes, Reidar F. (Norway): **Recent dental study of the inhabitants of Tristan da Cunha.** Abstr. *J. D. Res.* **18**:243-4. June, 1939.

Earlier reports from Tristan da Cunha, based upon 12 to 48 hours stay on the island, have pointed out the excellent general and dental health of the population. As this isolated place in many respects offered a virgin field for a prolonged study, a Norwegian Scientific Expedition, including botanists, zoologists, geologist, surveyor, sociologist, physician, dentist and assistants, carried out an extensive investigation on Tristan da Cunha, from Dec. 7, 1937, until March 28, 1938. Study of the population (188 in number), with clinical, bacteriological, dietary, general hygienic, and sociological examinations were carried out. The clinical oral examinations are supported by radiographs, plaster reproductions of all teeth and bacteriological and chemical tests of saliva. Shed and extracted teeth reserved for further study. General: Remarkable good physique and freedom from infectious and systemic diseases. Staple food: fish and potatoes. Population doubled, but food-sources, domestic as well as imported, decreased during this century. Local: Developmental enamel defects common in last generation, though remarkable low caries incidence. Inflammations of gingivae, but few cases of teeth lost due to parodontal disease. Arch form, articulation, crowding of teeth, little abrasion, abundance of food debris and tartar, saliva condition, etc., are factors to be considered. Material will be worked out within next year at the Dental School of Norway.

121—Strauss, L. H., and Scheer, P.: **Ueber die Einwirkungen des Nikotins auf den Vitamin C Haushalt.** The action of nicotin on vitamin C metabolism. *Zeit. Vitaminforschung.* **1-2**:41. 1939.

Studies were made of thirty cases, consisting of healthy men and women between the ages of 18 and 40. Before testing the effect of nicotin, strict care was given to determining that these people were in a state of vitamin C saturation, observing the principles of Wachholder, Hamel, and Wieters. Ascorbic acid excretion in the urine was determined through the administration of Cebion or Redoxon (200 mg.), without smoking; then, under the same conditions of diet, etc., ascorbic acid excretion in the urine was studied after smoking, with the same vitamin C dosage. For this purpose, the individuals smoked one to three cigarettes on an empty stomach, even when light symptoms of intoxication developed. Ascorbic acid content of the urine was tested before the experiment, and 1, 3, 5, 7, and 24 hours afterwards, using Tillmans' titration method.

The results showed that the action of nicotin on healthy subjects, saturated with

vitamin C, is to produce a constant and marked reduction in urinary ascorbic acid following a saturating dose. (Similar effects on the vitamin B_1 excretion is obtained by the same means.) These changes are considered to be related to endocrine mechanism (thyroid and adrenal) and to the vegetative nervous system, and to involve an increase of endocrine activity, a raised sympathico-tonus and an enhanced level of general oxidative activities.

—*M. B.*

122—Sulser, Glenn F., Brening, Robert H., Fosdick, Leonard S.: **Some conditions that affect the odor concentration of breath.** *J. D. Res.* **18**(4):355-59. Aug., 1939.

Breath odor, *fetor ex ore,* is known to arise or to be influenced in many cases by mouth conditions. There are other instances where oral conditions have no bearing and where little or no benefit is to be had from improved mouth health and hygiene. When breath odors come from the mouth oral hygiene and other local operative procedures may play a definite part in alleviating the condition. The statistical study presented indicates that certain variables modify the condition, namely, periodontal disease, time after meals, age, sex, caries, and gingivitis. In order of their importance in this regard are suppurating pockets, gingivitis, and caries.

—*C. R.*

123—Tenenbaum, Benjamin, and Karshan, Maxwell: **Factors in saliva correlated with the occurrence of calculus.** *J. A. D. A.* **26**(12):1965-71. Dec., 1939.

Stimulated and unstimulated saliva of persons with and without calculus was analyzed for total Ca, inorganic P, pH, and protein. The age range of subjects studied was between 20 and 60 years.

In both stimulated and unstimulated saliva of adults, the most striking difference between the calculus-free and calculus groups appeared in the calcium content of the saliva. The mean values for calcium were lower in the calculus-free than in the calculus group, the differences being statistically significant. The mean values for inorganic phosphate were likewise lower in the calculus-free group for both types of saliva, the difference between the two groups being statistically valid in the case of stimulated saliva. For unstimulated saliva, it is also likely that the difference between the means is not due to chance. The difference between the groups for the pH of stimulated saliva may be regarded as significant.

These findings indicate that the average concentration of total calcium and inorganic phosphate in both unstimulated and stimulated saliva, and the average pH of stimulated saliva of persons who form calculus are relatively such as to favor the precipitation of the inorganic salts found in the deposits.

Mean Values For Unstimulated Saliva of Calculus-Free and Calculus Groups.

Type of Case	No. of Cases	No. of Sets of Analyses	Age	Total Calcium	Inorganic Phosphate	Protein	pH*	
				Mg./100cc.			Initial	Final
Calculus-Free	18	32	30.2	5.6	17.1	298	6.76	6.86
Calculus	28	63	42	7.1	19.8	348	6.77	6.90

*An approximately fifteen-minute interval, during which a 5cc. sample of saliva was collected for determination of Ca, P and protein, intervened between the determination of the initial and final pH.

Mean Values For Stimulated Saliva of Calculus-Free and Calculus Groups.

Type of Case	No. of Cases	No. of Sets of Analyses	Age	Total Calcium	Inorganic Phosphate	Protein	pH*	
				Mg./100cc.			Initial	Final
Calculus-Free	34	69	29.6	5.1	11.9	298	7.00	7.23
Calculus	59	116	40	6.7	13.9	289	7.12	7.33

*The interval between the initial and final pH determinations was about ten minutes for stimulated saliva.

Author's Abstract.

124—Tomlinson, T. H., Jr.: Oral pathology in monkeys in various experimental dietary deficiencies *Public Health Reports*, **54**:431. Mar. 17, 1939.

This paper reports the oral pathology found in the thirty-nine "Macacus rhesus" monkeys included in the study of Topping and Fraser, appearing in the same Public Health Report, on diets deficient in certain vitamins (A, C, D, and B_2 complex). Deficiencies resulted in the development of necrosis of the periodontal tissues and oral mucosa of varying extent, qualitatively similar in the B_2 complex deficiencies with variations in the flavin and nicotinic acid factors, in the C deficiency, and in the D deficiency; probably greatest in extent in the B_2 deficient groups. Microphotographs of sections accompany the article.

—*J. S.*

125—Topping, N. H., and Fraser, H. F.: Mouth lesions associated with dietary deficiencies in monkeys. *Public Health Reports*, **54** (11):428, Mar. 17, 1939.

An experiment designed to determine the occurrence of oral pathology in monkeys on selected dietary deficiencies is recorded, which indicate that certain of the dietary deficiencies tested (vitamins A, D, C, and B_2 complex) are associated with the development of varying manifestations of gingivitis, stomatitis, periodontal disease, and noma.

Attempts at transmission of organisms from infected lesions to normal monkeys on stock diet by the investigators is extremely interesting. Of this experiment they say:

> It would seem from these 3 separate attempts at transmission to 10 normal animals on a stock diet that even though spirals and fusiforms were present in relatively large numbers, they were incapable of initiating primary or secondary lesions regardless of whether the tissues had been previously traumatized.
>
> One monkey deserves an added comment. In this monkey the inoculation was made by a deep swab of the socket of a superior central incisor which had been removed several hours before. This should have furnished adequate anaerobiosis for the growth of the organisms, yet healing went on normally and at no time were any unusual reactions noted.

—*J. S.*

126—Van Kirk, Lawrence E.: Tooth loss in diabetics. *J. D. Res.* **18**:245-6. June, 1939.

As the first step in a study of oral conditions associated with diabetes mellitus 200 patients were examined in the diabetic department of the Falk Clinic. The ages of the patients ranged from 5 to 76 years. At this time the average number of teeth remaining in the mouths of these patients in various age groups is reported. This mean is compared with a similar mean calculated from an examination by the Metropolitan Life Insurance Company of over 12,000 cases. From this later study only the mean was available at this time, so that the computation of the standard deviation and significance of the difference of the 2 means is impossible. Further collection of statistical data will make this evaluation of the results more significant. Apparently, the tooth loss in the diabetic patients was considerably greater than normal, especially in the older groups.

Number of teeth remaining in mouth

AGE	FEMALE	MALE	TOTAL
(Under 30)			
Diabetics	22.1	23.6	22.9
Normal	26.9	26.9	26.9
(30-39)			
Diabetics	17.9	8.6	13.6
Normal	23.5	24.2	23.9
(40-49)			
Diabetics	9.9	19.1	11.9
Normal	18.7	22.7	21.3
(50-59)			
Diabetics	5.0	12.9	6.8
Normal	16.5	18.1	17.1
(Over 60)			
Diabetics	6.3	8.1	7.3
Normal	15.8	14.7	14.9

—*Copy*

127—Wiebel, H.: Untersuchungen ueber Vitamin C-Belastungen bei Sportstudentinnen. Studies on the vitamin C dosage of female sport students. *Dtsch. med. Wschr.* **2**:60. 1939.

According to many authors, vitamin C has, in addition to its other actions a tonic action, producing an increased productive power, or efficiency. In spite of the difficulties and factors that cannot be controlled in such an experiment, the author undertook to study the effect of vitamin C on the physical efficiency of women athletes. The studies were begun in the middle of January, when the average diet is poorest in vitamin C, so that the administration of synthetic vitamin C could best be observed. The group that was selected for the experiment was first tested for vitamin C saturation, by titration of the urine (according

to the method of Jezler and Niederberger). When all the individuals showed a vitamin C saturation, the actual experiment was begun: one half of the group was given Redoxon tablets, and the other half was given tablets looking and tasting exactly the same but without any vitamin C.

After three months, the results were obtained. To the question of whether the tablets had increased the physical efficiency of these women athletes, only six answered in the affirmative; of these six, two had taken the control tablets (without vitamin C). Of those who had actually taken Redoxon, all showed that their sleep had improved, and they had a noticeably better appetite.

—*M. B.*

128—Wodtke: **Die Vitamin C-Lage bei urologischen Erkankungen.** Vitamin C situation in urologic diseases. *Z. Rund.* **43.** 1939.

In urologic diseases, especially prostate hypertrophy, very high vitamin C deficits are observed; the dose of Redoxon must be increased from 300 mg. to 500 mg. daily. The vitamin C analysis of urine was done according to the method of Gander and Niederberger, using dichlorphenol-indophenol tablets. Twenty-one of thirty patients had a deficit of over 3000 mg. The standing control of vitamin C excretion in the urine, gave the information that in most cases 300 mg. Redoxon or more were necessary to fill the daily need. The general condition improved considerably under the Redoxon treatment, the appetite was stimulated, the inflammation disappeared, and temperature and pulse quickly came back to normal. Furthermore, favorable action was obtained on bleeding during and after operation, as well as good healing of wounds and scar-formation.

—*M. B.*

129—Wolf and Drigalski: **Der Vitamin-C-Spiegel im Blute und die Frage des C-Mangels.** The vitamin C pattern in the blood and the question of its deficiency. *Klin. Wchschr.* **31.** 1939.

Research was done on 100 people, both sick and healthy. In spite of the same food, the vitamin C value in these particular people vacillated the same as in people in general. There is no relationship to be found between this value and disease. If vitamin C is administered, it operates differently in each person. The value is low with food poor in vitamin C, and vice versa; the value falls on eating, without any significance. Both synthetic and natural vitamin C have the same effect. Distinctions in vitamin C patterns are to be explained according to constitution, but not according to the food. Low serum value for vitamin C does not necessarily mean hypovitaminosis; it is important that other symptoms, biological and clinical, be present. The author concludes: The proof for a proportionate causal effect of vitamin C deficiency in non-scorbutic diseases is as yet not conclusive.

—*M. B.*

(d) Clinical Etiology

(Continued from 10(2):108. July, 1939)

404—Albanese, P.: **La pyorrhée alvéolaire, maladie allergique.** Pyorrhea alveolaris, an allergic disease. *Schw. Monat. f. Zahn.* **8**:844. 1939.

None of the numerous hypotheses and theories proposed to explain the pathogenesis of pyorrhea is complete or satisfactory, but each contains some element of the truth. The causes involved may be considered as predisposing, and are divided into local and general (exogenous and endogenous). Among the local causes, there are: salivary calculus, slight traumata caused by poorly constructed fillings and prosthetic appliances, mechanical dis-equilibrium of intermaxillary forces, and bad oral hygiene which facilitates the growth of pathogenic flora. Among the general causes are: diabetes, gout, arthritis, infectious diseases such as tuberculosis, syphilis, neuro-vegetative disorders with humoral instability, and finally old age.

Each of these causes can converge toward the specific and constant cause, effecting a transformation of the physiological state of the paradental tissues, which thus acquire a state of allergy. This allergy in turn can orient itself to the hyperergic form and cause paradentitis, or to the anergic form and cause paradentosis.

—*M. B.*

405—Bircher, F.: **Drei fundamental verschiedene Faktoren bei der Entstehung der Paradentose.** Three fundamentally different factors in the production of paradentosis. *Paradentium.* **5**:95. 1939.

Among the primary causes of paradentosis three fundamentally different factor groups are involved.

1. Mechanical-anatomical factors: Overstrain and pocket-formation. In overstrain, we must consider not only its absolute value, but also its value relative to the powers of resistance of the tissues; so that overstrain in one case will lead to regressive changes, while in others it will be almost without effect.

2. Influence of general therapy on paradentium: Experience has shown that general, internal therapy has been very successful, especially in diabetes, and less in general rheumatic processes. General therapy can halt the disease and improve the condition, but cannot lead to a *"restitutio ad integrum,"* because of anatomical factors.

3. Disturbances in nerve function: Speransky, the present director of the Pawlow Institute, has concluded from extensive experimentation that neurodystrophic processes, as a predisposing factor, can produce disease processes. The theory of Slanck, concerning the effect of rheumatic processes, most nearly approaches the idea of Speransky.

If we consider the inter-action of all the factors, it should be clear that they can lead to progressive alveolar atrophy with chronic paradental disease and that in this way, various forms of paradentosis are brought about. Hereditary weakness of the organism along any of these lines can play an important role.

—*M. B.*

406—Bober: **Uber einige Fragen des Paradentoseproblems.** Some questions on the problem of paradentosis. *Paradentium.* **8**:167. 1939.

In the study of 2500 school children, from the ages of 13 to 16, 75% of the boys and 65% of the girls showed peculiarities of the paradentium which could later lead to paradentopathy. In diagnosing paradentosis, inflammatory processes of the oral mucosa must be considered. In agreement with Sigmund, in paradentosis, the inflammatory factor is a primary one. This inflammation, however, is the result rather than the cause of the resorption changes in the tissues. It is certain that the general endocrine metabolism is disturbed.

To search, with clinical methods for various responsible syndromes, must be considered useless.

In each case, a study of the general health must be made.

—*M. B.*

407—Brinch, O.: **Klinische Beobachtungen ueber die Aetiologie der Stomatitis aphthosa.** Clinical observations on the etiology of stomatitis aphthosa. *Paradentium.* **11, 12**:192. 1939.

Stomatitis aphthosa has been considered by most authors, until recently, an infection which produced ulceration, and supported their idea especially by the swelling of the regional lymph nodes; the ulcers were therefore treated with bactericidal substances: salvarsan, silver nitrate, iodine, etc. Dr. Brinch also had this view, but found that mild treatment produced less pain and had about the same effect. But recently, the author's idea on its etiology has been changed. One patient always showed stomatitis aphthosa after eating tomatoes, and explained that her condition was an allergic reaction of the oral mucosa. Subsequently, the author has found six other cases of stomatitis aphthosa due to specific allergy: tomatoes, pepper, smoked eels, a medicine (containing phosphoric acid, arsenic, and quinine), Virginia cigarettes, and one associated with asthma of unknown cause. The allergic etiology of this condition seems more reasonable, since the symptoms appear suddenly, and the ulcers are located on the looser mucosa. The regional lymphadenitis is now clearly seen to be due to secondary infection of the exposed submucosa. Since the allergic theory of the etiology may be assumed, the author advises that we attempt to find the specific allergy in each case, and warn the patient against it.

—*M. B.*

408—Bryan, A. W.: **Progress in the recognition of the etiologic factors in periodontal disease.** *J. of Periodont.* **10**:25-30. Jan. 1939.

In the division of "Diseases of Gingivae and Peridental Membrane" of the *Index—Dental Periodical Literature* more than 5700 articles are listed in eighty-three periodicals published since 1839. Referring to selections from this list and also to many references quoted by E. S. Talbot in his

book, *Interstitial Gingivitis or So-Called Pyorrhea Alveolaris*, the author attempts to show the progress in the recognition of the factors involved in periodontoclasia. It was found that both local and systemic factors were recognized by the very early writers and that some concepts which we are inclined to consider as modern were suggested by them. It is concluded that the most important progress has been in the recognition of the fact that the oral tissues are an inseparable part of a complete organism, and that disease in one is reflected by a disturbance of the other.

—*Author's Abstract*

409—Campbell, T. D.: **Food, food values and food habits of the Australian aborigines in relation to their dental conditions.** *Australian J. of Den.* **43**: 141. May, 1939. Also June, 1939.

The author's aim is to give some sort of comprehensive yet condensed account of a field dental study of an interesting primitive group—the Australian aborigines. Various observations are made on attrition and periodontal conditions.

Wear of the teeth commences from the very outset of tooth functioning and progressively increases to the production of extreme conditions of wear in old age. The relation of attrition to tooth form, function and pathological attack are discussed. Periodontal conditions are briefly mentioned. Mild inflammatory state of the gum margin is not uncommon after maturity is attained; alveolar abscess conditions occur not infrequently in old age, but gross oedematous and ulcerative periodontal lesions are rare.

Caries in the Australian aboriginal in his native state is shown—both from the study of skull and the living subject—to be considerably lower in its incidence than modern civilized man and even most primitive groups.

Tooth decay is almost completely absent among children and adolescents in their native state; with these natives it appears to be largely a disease associated with later life and senescence.

Food factors which produce alterations in tooth form and tooth functions appear to have a marked inhibitive effect, rather than production of pathological conditions.

Consideration is given to possible factors which may be concerned in the increase of caries with advancing years and with the adoption of refined food habits. Roughness of food, masticatory function, attrition, vitamins, carbohydrates, oral fluids are discussed. From the evidence derived from the study of these natives, it is suggested that the proportion of carbohydrates in the diet may be one of the particularly significant factors relative to tooth decay among them.

Extreme attrition affecting tooth form is outlined, as is the tooth function, it appearing that the obliteration of cusps, ridges and grooves is no great disadvantage in effective mastication.

—*J. A. Sinclair*

410—Chaikin, Bernard S.: **Anterior periodontal destruction due to the loss of one or more unreplaced molars.** *D. Items of Interest.* **61**:17-23. Jan., 1939.

Basically, the three following conditions are generally considered to be the causes of periodontium break-down: 1. faulty metabolism; 2. predisposition to disease; 3. local factors (possibly the most important of the three) which include those of a mechanical nature. Within the scope of this third group are those cases with unreplaced missing molars. The missing lower first molars, if allowed to go unreplaced, may cause migrations, extrusions, tipping of approximating teeth, and a lowering of the vertical relationships in the posterior segments. This distal malocclusion results in an excessive strain upon the upper and lower incisors, whose roots are invested in comparatively thin alveolus, and causes alveolar absorption, fanning out and spacing of the anterior teeth, marginal gingivitis, and possibly suppuration.

Three comparative cases are presented, all with two or more unreplaced missing molars, with resultant overbites, incisor spacing, subsequent anterior alveolar absorption, and pus formation.

—*Author's Abstract*

411—Coogan, John V., D. D. S.: **Relation of gingival infection to arthritis.** *D. Items Interest.* **61**:287. Mar., 1939. Abstr. J. A. D. A. **26**:56. 1939.

1. There has been established a definite relationship between infectious arthritis and gingival foci of infection that may be considered primary in a fair percentage of cases.

2. A cure of infectious chronic arthritis is unlikely as long as a primary focus continues to pour into the lymphatics and into the blood stream pathologic bacteria.

3. Gingival foci are frequently a source of infection. Only when the physician and dentist coöperate will the patient receive adequate care.

4. Three factors are in control of focal infection:

(a) Patient's immunity
(b) Natural resistance
(c) Virulence of the infection.

5. Septic areas in the interdental spaces may not be visible in X-ray examination. Therefore, thorough clinical examination is essential.

—*Copy.*

412—Dillon, J.: **Quelques manifestations et causes des maladies du paradentium.** Several manifestations and causes of diseases of the paradentium. *Schw. Monat. fur Zahn.* **9**:940. 1939.

Diseases of the paradentium are produced by the following causes:

1. Hereditary factors which produce dental and maxillary malfunction, with consequent diastems, malpositions, malocclusions, and prognathism. These anomalies lead to a weakness of the organs of support of the teeth and to a predisposition to disease.

2. Deficiency of nutritive elements, lack of substances of a consistency requiring prolonged mastication which acts as a massage for the gum and paradentium.

3. Ingestion of food which encourages accumulation of calculus, or which leaves a residue in the interdental spaces favoring bacterial growth.

4. Exogenous chemical elements, such as mercury, bismuth, arsenic, copper, and phosphorus, absorbed in medications or by working with them.

5. Avitaminoses. Vitamin A, deficiency produces, among other things, retardation of growth, disorders of tooth calcification, and digestive disturbances. Vitamin C bears a direct relationship to the teeth and paradentium, since its lack causes scurvy. Vitamin D, is antirichetic.

6. Traumatic forces may act on one or several teeth producing overstrain.

—*M. B.*

413—Faber, F.: **Die Bedeutung des C-Vitamins für die Aetiologie und Behandlung der entzuendlichen Vorstufen der Paradentose.** The importance of vitamin C in the etiology and treatment of inflammatory first symptoms of paradentosis. *Paradentium* **11, 12**:197. 1939.

The question of whether, and how far, gingival inflammation can be an expression of hypovitaminosis C is still unsettled. Avitaminosis C, of course, produces the clinical syndrome of scurvy; but the effects of partial lack of vitamin C are different, and are too little considered. However, hypovitaminosis C cannot by itself produce paradental changes, such as inflammation, bleeding, etc.; there must be other local factors, which produce gingivitis because the resistance of the tissues is lowered due to vitamin C deficiency. Therefore, internal therapy (that is, administration of vitamin C) alone cannot cure gingivitis; the local factors must be removed. On the basis of scientific-clinical knowledge, it can be definitely stated that inflammations of the gingiva, at least in a large majority of cases, result from an impoverishment of the organism in vitamin C, and often constitute the first clinical sign of such a condition. The author's therapy consists in thorough local treatment, prescription of a proper diet, and parenteral and oral administration of ascorbic acid preparations. As for vitamin A, which often is of some importance in these diseases, enough of it is supplied in a normal diet to satisfy the body needs.

—*M. B.*

414—Gill, J. R.: **Relation of lost function to paradentosis.** *J. A. D. A.*, **26**:1520-1526. Sept., 1939.

In the treatment of paradentosis nothing is more prejudicial to a favorable prognosis than tooth loss. The prognosis is unfavorable in proportion to the number of missing teeth. How to correct this condition so as to restore the masticating efficiency and occlusal balance, thus preserving the paradental tissue, is one of the difficult problems in paradentic treatment.

When the cells of a tissue are undernourished, as they will be if the tissue of which they are elements is functionally inactive, they lose to a certain extent their natural resistance to disease. And this is what occurs in diseased paradental tissue.

Provided functional activity prevails, paradentosis can be controlled.

The greater percentage of partial dentures are constructed to meet existing conditions, and no attempt is made to restore lost function and at the same time preserve the tissue and protect the teeth used for retention.

It does not require great imagination to visualize the harm that may be done by imperfect anatomic restorations and cusp imperfections. Such conditions and their coexistence with paradentosis must be taken into consideration in the study of the etiology of dental and paradental disease.

—*W. W. Wainwright.*

415—Gottlieb, B.: **"Chamsin" and Pyorrhea.** *D. Outlook.*, **26**(10):445. Oct., 1939.

"Chamsin" is an intensely hot south wind which sweeps Palestine periodically and during these heat waves it has been observed that very rapid detachment of periodontal tissues occurs and many instances of acute lateral abscesses. These cases are doubtless due to lowered resistance in the connective tissues with tendency to inflammation which interferes with continuous deposition of cementum. Surgery is postponed whenever possible during the "Chamsin" since healing is likely to be retarded. Vitamin A (raw carrots and liver) is prescribed to counteract the lowered resistance.

—*C. R.*

416—Grimmer, E. A.: **Trauma in an erupting premolar.** Abstr. *J. D. Res.* **18**: 267-8. June, 1939.

Traumatic changes have been observed in an erupting permanent premolar. The deciduous molar has been riding on the tip of the crown of this tooth. The occlusal forces have been transmitted through this deciduous molar to the peridental membrane of the permanent premolar. Necrosis of the peridental membrane and resorption of bone was observed on the distal side of the alveolar crest. New formation of bone was found on the mesial side.

—*Copy.*

417—Kallay, Juraj V.: **Etwas Statistisches ueber Paradentopathien.** Some statistics on pathology of the paradentium. *Paradentium.* **11, 12**:193. 1939.

Dr. Kallay divides paradentoses into two groups, according to etiology: 1. Malignant progressive paradentosis, which arises from a constitutional-hereditary basis. The typical clinical picture shows no inflammatory change of the gingiva; the first symptoms are retraction of the gingiva and bone atrophy, especially in the anteriors. The patient often shows an athletic physical build, but a weakened local constitution. Often, there is a dis-coördination between nice long and wide yellow-white teeth and an inferior jaw process. (Solitary type of paradentosis, beginning with wandering of a single tooth, must be included in this group.) This pure form is seldom seen.

2. Secondary paradentosis is the second group. Here, the paradentium is just a reflection of all the changes the body can suffer from various causes. There is, therefore, no set clinical picture or type, and all the studies of metabolism, blood, etc., must be made; these paradentoses are not independent diseases, but the results of various causes. Etiologically, there are local factors existing in the mouth, and those in other parts of the organism.

The author then discusses the question of calculus, which he attributes to drinking water rich in calcium, with factors predisposing to its formation. Calculus plays an important role in the production of gingivitides; the irritation of the gingival margin produces an inflammation, which acts by pressure on the underlying bone to produce atrophy.

In a study of a group of 1363 men and 1235 women, the following were found:

1. Paradentosis existed in 31% of the men, 18% of the women; altogether, about 25% of the cases.
2. Paradentosis increases with age.
3. Paradentosis is twice as frequent in men as in women.
4. Gingivitis occurs twice as often amongst women (ovarian influence); calculus gingivitis almost as high.
5. Caries may be found together with paradentosis.

—*M. B.*

418—Köhler, H. J.: **Ein Fall von Skorbut in seiner Bedeutung für die ganze Vitaminfrage.** A case of scurvy in its meaning for the whole question of vitamins. *Dtsch. Zahn. Wschrft.* **34**:773. 1939.

The author cites a case of scurvy which was hospitalized and treated with vitamin C. After general condition of scurvy had been cleared up, Dr. Köhler treated the patient for his mouth condition, using local treatment (scaling, extraction of teeth showing foci of infection, etc.). The patient was also advised as to the proper diet.

There is another substance in citrus fruit, besides vitamin C, which has a flavin character, and has been called vitamin P by one group of investigators, and "citrin" by another; its action is concerned with capillary permeability.

The need for vitamin C is a variable rather than a constant quantity. In the case in question, although there was a deficient supply of vitamin C, no symptoms were evident for some time; when an infectious

nephritis broke out, the increased vitamin C requirement caused the development of scurvy. If the patient had used a well-balanced diet, he would never have had scurvy.

—*M. B.*

419—Loisier, P.: **Paradentoses et glandes endocrines.** Paradentoses and endocrine glands. *L'Odont.* **9, 10**:447. 1939.

Dr. Le Norcy, from his studies, drew the conclusion that pyorrhea results from a neuro-endocrino-humoral disorder. This conclusion, which seems to be accepted (with certain variants) by a majority of authors, brings up the question of the systematic study of the endocrine state of a large number of paradentotics.

The author discusses the methods at his disposal, in studying both single and multiple endocrine glands, with special emphasis on the thyroid. The number of his observations is not sufficient to allow the formulation of definite conclusions. After about 50 studies, he is convinced that, although it is impossible to affirm that paradentoses are of endocrine origin, at least he is certain that, with the proper method, one can always find an endocrine disorder in a patient with paradentosis.

—*M. B.*

420—Mosuenck, A. van: **A propos de stomatite ulcéro-membraneuse.** Concerning ulcero-membranous stomatitis. *La Rev. Belge de Stom.* **3**:209. 1939.

Etiology: The causative agent is the spirillo-bacillus of Vincent, and since this organism is found in Vincent's angina, the author investigated the possibility of a relationship. He found in 8 out of 10 cases of this type of stomatitis a previous throat infection. Most cases of this stomatitis start in the region of the third molar (especially on the left side); since the retro-molar space is frequently a susceptible area for infection, the author thinks that microörganisms spread by direct extension from the throat to the third molar region. Many cases of ulcero-membranous stomatitis are associated with a scorbutic gingivitis, therefore, vitamin C deficiency is also an etiologic factor. The disease advances from the third molar to the whole molar region then to the incisors, first the lower, then the upper. The reason for this localization is that these areas are particularly subject to gingival irritation, due to calculus deposit, and therefore less resistant to infection.

Treatment: The treatment consists of complete and careful removal of all calculus, and the prescription of a 50% solution of oxygen water every hour for two days as a mouth wash; and finally elimination of irritants such as tobacco and alcohol. The results with this method are excellent. This does not mean that caustics are never to be used; they are needed in acute cases to stimulate necrotic and atonic gingivae and in chronic cases to remove hypertrophic tissue.

—*M. B.*

421—Morrison, W. A.: **Serious conditions associated with dental infection.** *D. Mag. and O. Topics.* **56**:617. July, 1939.

In this article Morrison reviews a lecture given by Dr. B. F. Blois Lawton on the serious conditions associated with dental infection. A distinction between closed and open infected areas is discussed. Stomach disease may result from passage of bacteria from open lesions of the mouth into the stomach. Other factors as well as infection may be involved, such as insufficient and abnormal teeth, badly fitting dentures, irritating articles of diet, tobacco, alcohol, gastritis, bowel infections, chronic nephritis, and pyelitis. Various infections of the eye are discussed as a probable or possible result of dental foci of infection.

—*J. A. Sinclair.*

422—Nesson, John H.: **The unreplaced tooth; its relation to periodontal and dental health.** *D. Digest,* **45**:370. Oct., 1939.

This article represents a study carried on over a period of sixteen years and shows the abnormal, pathologic, and unesthetic results from failure to replace a missing tooth. Over one hundred changes that may take place in the teeth, gingivae, alveolar structures, and the face and jaws are mentioned. Twenty-two specific gross, roentgenologic, and microscopic disorders resulting from the loss of the lower first molar are enumerated. Conservative treatment of the third molar with a view towards its retention when possible is emphasized.

A few of the inevitable results from failure to replace a missing tooth follow:

1. Destruction of the contiguity of the dental arch, the harmony of the facial structures, and the coördination of the masticatory machine as a unit.

2. Pathologic changes leading to complete destruction of periodontal tissues and tooth structure.

3. Traumatogenic occlusion, with possible consequent periodontitis, hyperemia, and degeneration of dental pulp, and loss of teeth.

4. Changes in the temporomandibular relations and closure of the bite, leading to irritations to the tongue, lips, and cheek muscles with perhaps eventual malignancy.

The article is well illustrated with twenty-two illustrations from practical cases, some of them representing classical conditions. The article is of particular interest to periodontists, but equally important to the general practitioner and the patient.

—*Author's Abstract*

423—Neuhässer, P.: **Die Ganzheitsbetrachtung in der Karies—und Paradentoseprophylaxe.** The whole viewpoint in prophylaxis of caries and paradentosis. *Dtsch. Zahn. Wschrft.* **26**:585. 1939.

To prevent widespread dental disorders in the coming generation, one of the important measures is the proper regulation of the diet of pregnant women, and seeing that the milk of nursing mothers contains the proper vitamins. The next consideration is the diet of growing children. Not only is a diet containing proper vitamins and minerals important, but the child must have sunshine and fresh air. Serving raw food, at the beginning of every meal is beneficial. The general health of the individual is important in its relation to caries and paradentosis, especially to the latter.

The author comes to the following conclusions:

1. To fight caries and paradentosis, the collaboration of physicians and dentists is necessary; and the education of people in this connection is extremely important.

2. The loss of teeth can be prevented if we provide mothers with a well-planned mode of living, including a well-balanced diet.

—*M. B.*

424—Nissle, A.: **Ueber aetiologische Beziehungen von Paradentosefaellen zur Darmflora und Versuche einer Kausalen Therapie.** The etiological relationship of paradentosis to intestinal bacteria, and search for a causal therapy. *Paradentium.* **11, 12**:201. 1939.

Dr. Nissle discusses the intestinal bacteria (which he calls "dysbacteria") and their relationship to pathological conditions. It is known that colon-dysbacteria produce various clinical and anatomical disease processes in distant organs by absorption of the poisons they produce into the blood stream; this raises the question of whether other chronic, non-infectious diseases with indistinct etiology, such as paradentosis, can be caused in a similar way. "Mutaflor," an emulsion of colon bacilli in gelatin capsules, has been used in the treatment of pathology due to colon bacilli; but the first attempt to use it for paradentosis was made by Dr. Krebs on two patients who had associated intestinal disorders.

It is possible that dysbacteria produce a decrease in vitamins. It is known from the work of Stepp and Schroeder that bacteria, which are characteristically like many forms of intestinal-dysbacteria, have the ability to destroy vitamin C; Morell has further shown, in his experiments on ascorbic acid, that physiological intestinal flora produce the necessity for an effective peroral vitamin therapy. But the question of intestinal flora as a cause of paradentosis is still unsettled and requires extensive research.

—*M. B.*

425—Orbøn, Balint: **Traumatic occlusion and gum inflammation.** *J. of Periodont.* **10**(1):47. Jan., 1939.

Traumatic occlusion produces injuries in the peridental membrane, such as bleeding, necrosis, etc., with subsequent resorption of the alveolar bone and widening of the peridental membrane. This ultimately leads to loosening of the teeth, especially if the trauma occurs from a back and forth movement (cusp interference).

Gum inflammation is a reactive process in the gum margin, largely due to local irritation. This irritation which produces the inflammation will lead to a deepening of the gingival crevice, pus flow (pyorrhea) and bone resorption. The development of pathological conditions is, in about 90 per cent

of all cases, the result of both traumatic occlusion and local irritation. That is why we usually find traumatic changes and inflammatory reactions in the same place at the same time.

Author's Abstract

426—Radusch, Dorothea F.: **The relationship between periodontal condition and certain dietary factors.** *J. D. Res.*, **18**:305-327. Aug., 1939.

Records of freely chosen diets submitted by 280 dental patients were studied statistically. Study of X^2 and P indicated little or no association between periodontal condition and age, or estimated intake of vitamin A, vitamin C, iron, and acid-base excess, but indicated significant association in the case of calcium, phosphorous, protein, animal protein, and milk.

The association between calcium and periodontal condition for a group of 135 females was 0.5. This was found to be negative; that is, the lower the calcium intake, the greater the tissue involvement. Estimation of milk intake was not quite as valuable for prediction as computation of calcium, although the calcium in the diet came predominantly from milk. Only 22 consumed a pint of milk daily.

Inclusion of factors other than calcium in the prediction of periodontal condition gave values no greater than for calcium alone. Of the factors studied, calcium was the most useful in prediction. These results were obtained when foodstuffs provided the source of calcium. Diet may be more of a factor in the development of periodontal disease than has been commonly accepted.

The same findings are reported in simplified form and without detailed statistical data in *J. A. D. A.*, **26**:1325-31. Aug. 1939

Author's Abstract

427—Rappaport, L.: **Diet and dentistry.** *D. Outlook* **36**(9):397-404. Sept., 1939.

A survey of the problem of diet from the dental standpoint as it affects both teeth and periodontal tissues. It presents nothing new but emphasizes important and established facts. Dentist has the background and should qualify himself to prescribe diet for patients' dental requirements; but only when there is no general pathology present. The physician is rarely interested in the dental relationships of diet.

So far today we know of only one means of reducing persistent caries; through the nutrition. Though not a complete answer this is our greatest preventive weapon. Refinements of technic and neglect of prophylactic measures have made dentistry too costly for the great majority of people, and the reduction of disease of the mouth by preventive dietary methods is the logical economic solution of this problem. Every dental school should have a complete course in prevention of dental and periodontal disease. Our primary purpose must be to keep people healthy, and both dentist and patient would profit by greater attention to dietary factors.

—*Celia Rich.*

428—Schengel, H.: **Die Dentitio difficilis als ätiologischer Faktor bei der Entstehung der Paradentose.** Dentitio difficilis (difficult dentition) as an etiological factor in the production of paradentosis. *Z. Rund.* **46**:1753. 1939.

The syndrome of paradentosis is dependent on local irritation and general disturbances of body condition, and precipitated by the lack of resistance of the affected organs. Basically, the same etiologic factors produce paradentosis which we recognize in all forms of gingivitides and stomatitides. Therefore, paradentosis is in part due to overstrain of the dentition.

Dr. Schengel's article deals mainly with the influence of the third molar eruption on the rest of the dentition and on oral health in general. The frequency of paradental diseases, especially at the ages of 20-30, must to some extent be explained by a consideration of the pressure of the growth of the third molars and the transmission of the mechanical force up to the region of the incisors. The deduction would be the extraction of the third molars to remove one of the causative factors of the disease.

—*M. B.*

429—Silvers, Seymour H.: **Stomatitis and dermatitis venanata with purpura, resulting from oil of cloves and oil of cassia.** *D. Items of Interest.* **61**(7): 649-51. July, 1939.

Author's conclusion, "A case is reported of stomatitis and dermatitis venanata with purpura, resulting from oil of cloves and oil of cassia which were incorporated in a commercial preparation for the prophylactic treatment of the teeth."

430—Tishler, Benjamin: **Periodontia: A biological factor in the etiology and progress of marginal atrophy.** *J. A. D. A.* **26**(2):193-97. Feb., 1939.

The biologic factor which governs the development of marginal atrophy is cell resistance. The responsible etiologic factor is a local irritant either mechanical or chemical; both cause capillary stasis, permit bacterial invasion and tissue disintegration. Mechanical factors include food impaction, poor dentistry, calculus (mucinous plaques, food particles, and materia alba), and mouth breathing. The case of an elderly clinic patient who had never cleaned his teeth is cited. After scaling and polishing, the inflamed gingivae healed and no pockets were found. The most striking proof in the belief of the writer is an invariable retrogression to the original gingival condition when patients neglect to properly stimulate the gingivae after treatment. The paper stresses the importance of possessing a knowledge of biologic factors and reëmphasizes the influence of cell resistance in marginal atrophy cases.

—*Author's Abstract*

431—Topping, N. H., and Fraser, H. F.: **Buccal lesions associated with dietary deficiencies.** *Public Health Reports*, (Washington, D. C.) **54**:413-458. Mar. 17, 1939, Abstr. in *J. A. M. A.* **112**(22):2367, June, 1939.

Topping and Fraser studied the occurrence of pathologic changes in the oral cavity in monkeys on selected diets deficient in vitamin A, D, C or B_2. Certain of the dietary deficiencies tested were associated with the development of varying manifestations of gingivitis, stomatitis, periodontal disease, and noma. Noma developed in the buccal mucosa only in monkeys receiving diets deficient in vitamin B_2. Comparable animals maintained on adequate diets showed little or no evidence of such oral conditions. In addition, monkeys maintained on a stock diet showed no evidence of gingivitis or stomatitis when material from affected monkeys was transferred directly to them. Diets supposedly deficient in vitamin A were about as efficient in preventing the development of oral lesions as the artificial control diet. In the remaining deficiency groups, however, there is a definite difference in the numbers developing lesions and the severity of these lesions.

—*Copy.*

432—Torrens, R. G. (Dublin): **Gingivitis: Its chemical causation and cure.** *Brit. D. J.* **67**:70. July 15, 1939.

The basis of the article is the research directed toward an attempt to co-relate dental and other diseases to a common chemical denominator, the disturbance in the energy equilibrium of the chemico-physical content of the blood-stream. According to the theory the progress of general disease runs pari-passu with dental defects.

The common denominator of all disease can be found in the blood stream by an ultra-microscopic examination of the serum. The size of the colloidal particle of the serum is the diagnostic feature. In normal serum the particles are numerous, near the same size and are in active Brownian movement. As disease progresses some particles become smaller and may disappear while other particles become larger.

According to the author this disease (gingivitis) is but the outward and visible indication of a gradually increasing "acidosis" which will at one point of intensity turn to a relative "alkalosis." Besides orthodox treatment general treatment is directed toward correcting acidosis and alkalosis.

433—Widenbauer: **C-Hypovitaminose.** Hypovitaminosis C. *Klin. Wschr.* **24**. 1939.

In this article, Dr. Widenbauer states that it was formerly believed that the vitamin content of the average diet required no special consideration. A change of this viewpoint and a remarkable impulse for vitamin research brought into existence the idea of hypovitaminosis, which was especially applied to vitamin C. According to Widenbauer, the human organism strives for an optimal saturation, and if practically no ascorbic acid is excreted in the urine without vitamin C overburdening, then it follows that the intake is for the most part too low. That a tendency toward higher saturation values exists, can be seen from the proportions in milk secretion and in the maintenance of the fetus.

—*M. B.*

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